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A REVISION OF THE CENTRAL AND SOUTH
AMERICAN *NOTOXUS* AND DESCRIPTION OF A
NEW GENUS, *PLESIONOTOXUS*
(Coleoptera: Anthicidae)

by
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INTRODUCTION

Notoxus is one of the last large anthicid genera of the New World which is badly in need of revision. The North American (the United States and Canada) species have been adequately collected and described, with only a few species remaining still unnamed. The species from Central America (Mexico through Panama) are less well known. Recent collecting in Mexico has revealed that the Central Plateau is the center of species diversity for the New World.

This revision of the Central and South American species includes some twenty-seven previously named species and twenty which are described as new. The relationships within the genus are primarily derived from a numerical analysis of all the New World species (a total of seventy-two species). Most of the South American species which had been placed in *Notoxus* have been removed to *Mecynotarsus* (Chandler 1977) or are placed in a new genus, *Plesionotoxus* (p. 8).

Acknowledgments

Many individuals deserve my deepest thanks for their help in this study. The following list indicates those curators of collections and private collectors who cooperated with the loan of specimens. Most of the abbreviations of the collections are from Arnett & Samuelson (1969). The abbreviations are used to indicate the present location of types or of the specimens studied for the revision.

Public collections:

- AMNH: American Museum of Natural History; Lee H. Herman, Jr.
- BMNH: British Museum (Natural History); C. M. F. von Hayek.
- CASC: California Academy of Sciences; H. B. Leech, P. H. Arnaud, Jr., D. H. Kavanaugh.
- CDAE: California Department of Agriculture; F. G. Andrews.
- CISC: University of California, Berkeley; J. T. Doyen.
- CNCI: Canadian National Collection; E. C. Becker.
- CUIC: Cornell University; L. L. Pechuman.
- FMNH: Field Museum of Natural History; H. S. Dybas.
- LACM: Los Angeles County Museum of Natural History; J. P. Donahue.
- MCZC: Museum of Comparative Zoology; J. F. Lawrence, J. C. Scott.
- MNHN: Museum National d'Histoire Naturelle, Paris.
- MSUC: Michigan State University, R. L. Fischer.
- OSUC: Ohio State University; C. A. Triplehorn.

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²This paper is a portion of the dissertation submitted to the Ohio State University in partial fulfillment of the requirements of the Doctor of Philosophy Degree at that institution.

TAMU: Texas A & M University; H. R. Burke, S. J. Merritt.
TTCC: Texas Tech University; D. E. Foster.
UCDC: University of California, Davis; R. O. Schuster.
UMMC: University of Michigan; R. D. Alexander.
USNM: United States National Museum; T. J. Spilman.

Private collections:

DSC: Donald S. Chandler, Safford, Arizona.
FGW: Floyd G. Werner, Tucson, Arizona.
HAHC: Henry Howden, Ottawa, Ontario, Canada.
KSC: Karl Stephan, Tucson, Arizona (now placed in the Florida Department of Agriculture, Gainesville, Florida).
MGF: Gerhard Frey, Tutzing bei Munchen, West Germany.

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TAXONOMIC HISTORY

Fabricius (1801) described *Notoxus monodon* from "Virginia" for the first record of the genus from the New World. Say (1817), LeConte (1824, 1847) and Hentz (1827) added four more species from the eastern United States. LaFerté-Senectere (1848) treated the family for the world and described four new species from the United States, two from Mexico and two from South America.

In the period following LaFerté's work, many of the United States species were described (LeConte 1851, 1852, 1876; Horn 1884, 1892; Casey 1895). No new species have been added since the works of Fall (1902, 1916, 1932) and Blaisdell (1929, 1936). Recently Chandler and Hagen (1977) listed a number of new synonymies for North America.

In contrast the Central American fauna was largely ignored until near the end of the nineteenth century. Two species were described from the West Indies (Chevrolat 1877; Quedenfeldt 1886), and fourteen new species were added to the Central American fauna by Champion (1890) in his revision of the Anthicidae for the *Biologia Centrali-Americana*. The remainder of the neotropical species were added by Pic (1901a, 1901b, 1904, 1912, 1913, 1914a, 1914b, 1916, 1918) and Heberdey (1936).

Champion's work (1890) is still useful as he described the male characters of the species and had excellent illustrations. Pic's descriptions are almost completely useless since he seldom mentions any characters of use in separating species. Many of Pic's species have been removed to *Mecynotarsus* (Chandler 1977) or to *Plesionotoxus*, new genus. Of the four Pic names re-

tained in *Notoxus*, one is a senior synonym, two are junior synonyms, and the last is placed as *Incatae sedis*.

The last paper dealing with the Central American *Notoxus* was Pallister's (1955) identification of the Anthicidae collected on the Central Plateau of Mexico. This work is of some importance in that several species from the United States were recorded from Mexico for the first time.

BIOLOGY

Most of the available biological information on *Notoxus* is restricted to the types of habitat in which the adults have been collected. No life histories have been described for any of the species. The only larvae figured have been of *N. monoceros* (Boving & Craighead 1930), an unknown species of *Notoxus* (Peterson 1951) and of *N. monodon* (Cuthbert 1967). The larva described by Peterson was collected in soil from a peach orchard, while the *monodon* larvae (misidentified as *N. calcaratus* in Cuthbert) apparently will bore into the roots of sweetpotatoes. The larvae have a well-developed mola on the mandible and probably feed on plant material. The pupa of *monodon* is also figured in Cuthbert.

The adults are known to be associated with vegetation and flowers (Blatchley 1910). I have collected the majority of my specimens by beating vegetation or examining the ground beneath low vegetation. Other collection methods are based on the adults' attraction to white or ultra-violet light and to cantharidin or meloid beetles. Almost all of the New World species have fully developed wings, with both sexes of *obesus* and females of other species in the *sparsus*-group being exceptions. The majority of the winged species have been attracted to white, arc or ultra-violet lights. One of the more recent methods of collecting *Notoxus* is based on their attraction to cantharidin, which is found in meloid beetles. Abdullah (1964) lists the Old World Anthicidae which have been attracted to cantharidin and dead meloids, while van Hille (1954) used cantharidin as a collecting bait. Chandler (1976) used both cantharidin and meloid beetles as baits and found that both were very effective in attracting various species of *Notoxus*. Only two species, *N. eximius* and *N. opacus*, were known to be near these baits and not attracted. Blaisdell (1936) mentions that he used "chemical" traps to collect several species of California *Notoxus*, but the chemical used was not indicated.

The adults are known to eat a wide variety of foods. Abdullah (1969) observed *N. monoceros* feeding on bread, sugar water, minced beef, freshly cut grasshoppers and a banana skin. Hinton (1945) notes that *N. monodon* was found on some apples sent from North America to Germany. Records in this revision indicate that *N. apicalis* is attracted to freshly harvested crops. Essig (1926) mentions that the "fruit *Notoxus*", *N. constrictus* (his figure of this species is actually *N. calcaratus*), was common in orchards feeding on damaged or drying fruit. Also mentioned is that *N. calcaratus* acts similarly and that *N. monodon* (= *desertus*) was collected boring into twigs of apple trees in California. This latter record is almost certainly incorrect as the beetles were probably just resting in these holes. In Colorado Gill (1913) noted that *N. monodon* (= *desertus*) would feed on the pupae of the fruittree leafroller, *Archips argyrospila* Walker. *Notoxus* often have been observed feeding on the dead insects which accumulate at lights. Loan (1972) mentions that *N. anchora* was common in and feeding on alfalfa in Ontario, although it apparently is not considered a pest.

There have been two instances where the biological control value of *N. calcaratus* has been examined. Butler (1966) in Arizona noted that this species would feed on the eggs of the cotton bollworm in the field. Orphanides *et al* (1971) found that *calcaratus* in California would feed on the eggs and first instar larvae of the pink bollworm in the laboratory. Both studies noted that although the adults did not eat many eggs or larvae, this species could be very common in the field and thus may have a noticeable effect on a pest population.

The use of the pronotal horn apparently has not been previously recorded. Specimens of several species collected in New Mexico and Arizona were placed in a vial containing sand, water and food. As midday approached the beetles would become very active even though the vials had been placed in some shade. Many individuals were observed to move about until encountering a depression or crack in the sand. The head and pronotum were then worked alternately up and down as the beetles burrowed down into the depression forming a tunnel which could be more than an inch long. Species of the genus are often found in or near sandy areas. Another Notoxine genus, *Mecynotarsus*, is known to be associated with dunes, and individuals will quickly burrow into loose sand when disturbed using a similar motion of the head and pronotum.

There is one known case of parasitism of *Notoxus*. Loan (1972) noted that a braconid wasp, *Syrrhizus agilis* (Cresson), was an internal parasite of adults of *N. anchora*. The only mating behavior known was recorded by Abdullah (1969) for *N. monoceros*.

ZOOGEOGRAPHY

Notoxus is recorded from all the continents except Antarctica, with very few species being known from South America and Australia. The majority of the species are recorded from three general areas: the southeastern quarter of Africa, the eastern Mediterranean and central Mexico. These regions are generally semiarid and have an important grassland component with various interrupting mountain ranges. Species diversity is apparently highest at the grassland-forest interface.

Only one group, the *monoceros*-group in Eurasia, has received a recent thorough taxonomic treatment (Heberdey 1936). Recent faunal works have been by Bonadona (1974) for France, Kaszab (1969) for central Europe and van Hille for South Africa (1961). The relationships between the faunas of the different continents have been unexplored and there have been few attempts to define the genera.

The area under consideration in this study, Central and South America, includes all of the Neotropical faunal province and the portion of the Nearctic faunal province present in northern Mexico. The genus in the New World is predominantly Nearctic with all of the species-groups (see p. 7 and Figure 65 for discussion of species-groups) having most of their members in Mexico or the United States.

Two species-groups, the *monoceros*- and *sparsus*-groups, have the majority of their species in the western United States. Previously the *monoceros*-group was known only from the Palearctic region. Five Nearctic species are here placed in this group with four of the five species occurring in an area extending from northern California to Washington. Most of the species in this group have asymmetrical genitalia, which is a characteristic of the Nearctic species, with a few of the Palearctic species possessing symmetrical genitalia.

The *sparsus*-group is almost completely restricted to the western coastal

states. This group possesses symmetrical genitalia. Both groups have in common robust genitalia and lateral apical tubercles on the elytra of the male. The form of the symmetrical genitalia in both groups is similar. The distribution pattern of both groups, principally in the western and northern United States, is a pattern common to many groups introduced to the New World from Eurasia via the Bering Land Bridge. Taking into account the fact that the two groups are more difficult to separate in the Old World, it appears likely that both groups originated in Eurasia and were introduced across the Bering Land Bridge which was periodically present during the late Pliocene (Gressitt 1974). A re-examination of the Old World species in the *monoceros*-group is needed to firmly delineate the group characteristics.

The remaining species-groups appear to have originated in the region of central and southern Mexico. The greatest species diversity is found on the southern half of the central plateau where there is an intermixing of the mesquite-grassland and pine-oak forest zones (Leopold 1950). At least one member of all the species-groups (except the *montanus*-group and excluding the *sparsus*- and *monoceros*-groups) and most of the species which were not placed in groups are found in this area. Many of the species-groups exhibit a simple pattern in which one species is found on the eastern half of the Central Plateau, another on the western half, and often a third species in the southwestern United States.

Rosen (1975) recently analyzed the patterns of animal distribution in the Caribbean region. *Notoxus* species-groups appear to fit the North American-Caribbean Track (distribution pattern) fairly well, even though Rosen had applied it only to lowland groups. Groups placed in this pattern have Mexico containing the greatest number of species and with a few species ranges extending into the southern United States, the most northern portion of South America, and the Antilles. The *monodon*-group, which is primarily found in the lowlands, exhibits this pattern perfectly with two species in the Greater Antilles, two reaching northern South America, three in the United States and four in Mexico.

Continental land bridges have been of variable importance in influencing the distribution of *Notoxus*. The Bering Land Bridge was probably the means of introduction of members of the *monoceros*- and *sparsus*-groups, while the land bridge between Central and South America apparently has been of little importance in *Notoxus* movement. Rosen (1975) believes that the Central America region was mainly occupied by various islands from the Mesozoic until the Pliocene when the first complete land bridge was formed. Two members of the *monodon*-group are isolated in the Greater Antilles, but, using Rosen's model of Caribbean continental drift, they probably were isolated on these islands when they drifted east from their alignment near the North American Plate. Since only three species are present in South America, with two of these being widespread through Central America, it appears that *Notoxus* could not traverse this island chain and was probably introduced in or after the Pliocene when the Panama Land Bridge was formed.

Climate has probably been the greatest influence in determining the distribution of *Notoxus*. Perhaps the most important change occurred in the middle and late Cenozoic when extensive mountain building began taking place along the axis of the present-day Sierra Madre Occidental. As a result of this mountain formation rain shadows were formed in central Mexico and the Madro-Tertiary Geoflora (Axelrod 1958) evolved rapidly. By the late Miocene this flora extended from the current southern apex of the Central Plateau to the northern edge of the Great Basin. This flora is typical of the semiarid condi-

tions which *Notoxus* favors.

Other climatic changes of lesser influence were the pluvials and interpluvials of the Pleistocene, and the following Xerothermic Interval of the Recent. All of these have undoubtedly influenced *Notoxus* distributions by providing suitable climates for dispersal between mountain ranges, and then following with drier periods which would then isolate populations in the different major mountain ranges. The major separations apparently are between the Sierra Madre Oriental, the area around the Mexican state of Puebla, the Sierra Madre Occidental, and the southern apex of the Rocky Mountains in New Mexico-Arizona.

A reconstruction of the past history of the New World species can be derived from these events and current distributions. *Notoxus* probably evolved from seashore species which moved inland and eventually became isolated from the other groups of the Notoxinae. The genus is characterized by having few seashore species. A portion of the genus was then isolated in the Mexico area following the breakup of the supercontinents in the late Mesozoic. With the rise of the Madro-Tertiary Geoflora, extensive areas of Mexico gradually became drier and the conditions which *Notoxus* species appear to favor became widespread. *Notoxus* populations expanded northward with the geoflora into the United States. These populations were then confined to the margins of the mountain ranges when the grassland-forest areas were reduced by the continued drying on the plateau. This led to some degree of isolation of populations between the major mountain ranges, and eventually to speciation. Possibly the ancestors from which the species-groups are derived were present at this time.

Many of the present species which are not placed in a group are found at the southern apex of the Central Plateau, as are members of every group except the *montanus* group. This area apparently is the most heterogeneous favorable habitat for *Notoxus*.

With the onset of the Pleistocene pluvials, species could disperse between mountain ranges and were then isolated in the following dry periods. With this fragmentation the present species-groups appeared as populations which were isolated during one of the dry periods following dispersal. This would explain the distribution of many of the species-groups which have a different species on each half of the plateau and one or more species isolated in the southwestern United States. With following moister periods several species in a few of the groups have expanded their ranges and are now sympatric in the Chihuahua-Durango area and the Mexico City region.

METHODS AND MATERIALS

Over 3,000 specimens of *Notoxus* from Central and South America were studied. The specimens were separated into species by comparison of their external appearance and genitalia. Names were assigned to these species following the examination of all the types of the species, except for the LaFerté, Chevrolat, and Pic types in the Museum National d'Histoire Naturelle, Paris. Fortunately, specimens compared to most of the LaFerté types were available from the F. G. Werner collection, and the description or locality of most of the Chevrolat and Pic types was sufficient to associate names with species.

Each previously described species is represented by a general statement on the variation and characters of the species and the measurements of a re-described male. Types were not used to represent the species in the description since they were available for only short periods of time and were seldom

in the best of condition. The redescribed males were considered to be typical of the species and were generally collected near the middle of the species range. Males were used since they have more unique characters than females.

Comparisons were made using a Leitz Wetzlar stereo microscope at 64X. Male genitalia were prepared and examined following the procedure of Werner (1964). All genitalia were placed in genitalia capsules containing glycerine following study.

Measurements were taken using an ocular reticule and are entered in millimeters in the species descriptions. Drawings of the elytra and male fifth sternite were made using the ocular reticule at 64X. Drawings of the genitalia were made by sketching the general outlines as projected by a Ken-a-Vision slide projector and then filling in the fine details while observing the genitalia with the Leitz.

The distribution of each species is mapped only for Central America, unless it is a new species. In this case the distributions are continued into the United States as far as the map permits.

The classification used is based on a phenogram produced by a numerical analysis of the New World species (Fig. 65, Chandler 1976a). The limits of the species-groups were delineated through the patterns of groupings in the phenogram. Several species were not placed in a species-group as they either were not very similar to other species or the clusters produced contained a heterogeneous assemblage of species.

The similarity measure used was correlation and the phenogram was constructed using UPGMA. The numerical analysis was performed on the IBM 350 at the Ohio State University Computer and Research Center using the NT-SYS program package developed by F. J. Rohlf, J. Kishpaugh and D. Kirk.

NEW WORLD NOTOXINAE

The Notoxine anthicids are easily recognized by the protruding horn extending anteriorly over the head, and also by the lateral expansion of the mandibles. Three of the current Notoxinae genera (*Pseudonotoxus* Pic, *Hypsipistes* Waterhouse, and *Leptoprion* Krekich) are found only in the Old World. Both of the Notoxine genera known from the New World (*Mecynotarsus* LaFerté, and *Notoxus* Fabricius) are also found in the Old World. A new genus, *Plesionotoxus*, is proposed for a number of South American species which were formerly placed in *Notoxus*.

The following characterization of the genus *Notoxus* is based on all of the species available, which includes some twenty species from the Palearctic, Oriental and Ethiopian regions. The genus *Notoxus* is here defined as those Notoxinae with the following characters: erect tactile setae on the head outlining the horn when head is raised, mandibular explanation often with posterior margin, eyes with short aciculate setae between the facets, setae over body aciculate, not noticeably thickened or flattened; pronotum with distinct pit above the cervical notches, these pits densely setate, antebasal transverse impression distinct; lateral mesosternal margins straight or slightly curved outwardly; hind wings with 1A and 2A parallel, with cross vein at middle (Fig. 1); male genitalia with distinct phallobase, parameres large, either free or fused near base, penis or median lobe well developed (Fig. 2); the genitalia laterally flattened in general appearance.

Plesionotoxus is here defined as those Notoxinae with the following characters: erect tactile setae on the head outlining the horn when head is raised,

mandibular explanation with faint posterior margin, eyes without any setae between facets; pronotum with nude pit above the cervical notches, anteriorly directed setae near ventral margin of pronotum obscuring pits; horn with crest indistinct, lateral carinae from horn base to the cervix anterior to the pronotal pits, pronotum with antebasal transverse impression distinct; setae over body aciculate; lateral mesosternal margins straight to slightly curved inwardly; wing venation similar to *Notoxus*, with large sclerotized patch lateral to apex of Cu₁; male genitalia with phallobase and penis closely joined (Fig. 3, 4), partially fused, parameres distinct and joined to genitalia in apical third; genitalia flattened dorso-ventrally. This genus is easily separated from *Notoxus* by the anteriorly directed setae on the lateral margins of the pronotum and the carinae extending laterally from the horn base to the cervix.

The genus *Mecynotarsus* is very difficult to characterize on a world basis, or even for only the New World. There are several well-defined groups placed in the genus which are sufficiently distinct to be placed in new genera (Chandler 1977). This genus can be separated from the others in the New World by the lack of the pronotal pit above the cervical notches and the metatarsi being longer than the metatibiae.

Notoxus is represented by seventy-two species in the New World with most of these occurring in Mexico. *Plesionotoxus* consists of seven species with all of these being restricted to South America. *Mecynotarsus* contains thirteen species with the majority occurring in Mexico.

GENUS PLESIONOTOXUS, NEW GENUS

The type-species of *Plesionotoxus* is designated as *Notoxus lebasi* LaFerté. The genus is restricted to South America and is easily distinguished from *Notoxus* by the lateral carinae extending from the horn base to the cervix and the anteriorly directed setae over the pronotal pits. The species included in the genus are very similar externally and a revision of the group will require that the genitalia of the types be examined.

Plesionotoxus is perhaps most similar to *Pseudonotoxus* Pic by the form of the genitalia and the lateral carinae at the base of the pronotal horn. It is easily separated by the lack of setae between the eye facets, the absence of any modified setae on the body, and the distinct antebasal impression of the pronotum.

Plesionotoxus lebasi (LaFerté)

(Fig. 3, 4)

Notoxus Lebasii (sic) LaFerté 1848: 51-2, Table 21, fig. 16. Type locality: Colombia. Generotype of *Plesionotoxus*. Werner 1965: 22. Also known from Bolivia, Brazil, Panama and Peru.

Plesionotoxus argentinus (Pic)

Notoxus argentinus Pic 1912: 456. Type locality: Mendoza, Argentina. Bruch 1928: 193; 1938: 165.

Plesionotoxus boliviensis (Pic)

Notoxus boliviensis Pic 1914a: 250. Type locality: Bolivia.
 v. *Germaini* (sic) Pic 1914b: 61. Type locality: Bolivia.
 v. *innotatipennis* Pic 1914b: 61. Type locality: Peru.

Plesionotoxus informicornis (Krekich)

Notoxus informicornis Krekich 1913: 135-6. Type locality: Mendoza, Argentina. Bruch 1928: 193; 1938: 167.

Plesionotoxus gounellei (Pic)

Notoxus Gounellei (sic) Pic 1901b: 227. Type locality: Brazil.

Plesionotoxus venustus (Pic)

Notoxus venustus Pic 1901b: 227. Type locality: Argentina Pic 1911: 13. Bruch 1928: 193; 1938: 166.

GENUS NOTOXUS FABRICIUS

Notoxus Geoffroy 1762: 356 (not binomial, see Hemming 1954). Fabricius 1792: 210; 1801: 289. Say 1817: plate IV; 1824: 21; 1827: 38. LeConte 1824: 170 (*Anthicus*); 1851: 152; 1852: 92; 1876: 518. Hentz 1827: 375. LaFerté 1848: 21. Chevrolat 1877: ix. Horn 1884: 165; 1892: 47. Casey 1884: 189; 1895: 756. Quedenfeldt 1886: 121. Champion 1890: 203; 1893: 461. Pic 1894: 46; 1897: 215; 1901a: 227; 1901b: 89; 1904: 228; 1911: 5; 1912: 456; 1913: 8; 1914a: 61; 1914b: 250; 1916: 11; 1918: 117. Fall 1902: 257; 1916: 33; 1932: 56. Blatchley 1910: 1334. Krekich 1913: 135. Leng 1920: 162. Blaisdell 1929: 57; 1936: 144. Bruch 1928: 193; 1938: 165. Barber 1941: 25. Pallister 1955: 5. Werner 1964: 200; 1965a: 124; 1965b: 123. Generotype *Meloe monoceros* Linnaeus (cited as generotype in Bonadona 1971).

Monocerus Faldermann 1837: 106. LeConte 1847: 89. Generotype *Monocerus brachycerus* Faldermann, fixed by monotypy.

Geoffroy's (1762) work was rejected by the International Commission on Zoological Nomenclature (Hemming 1954) on the basis that it was not binomial. The first use of the genus *Notoxus* with a specific name was by Fabricius (1792), according to the literature dates in Pic (1911).

Three of the species named by LaFerté were collected by Piccolomini in "California." As has been noted by Werner (1964: 200), this locality is erroneous and the material was probably collected in the area around Mexico City. The three species of *Notoxus* collected by Piccolomini are commonly collected around Mexico City and this is probably the type locality.

Taxonomic Characters

Color and patterns: Color is expressed in simple English rather than Latin. The elytra exhibit the most useful color patterns. The basic pattern consists of light elytra with a median or postmedian band and darkened omo-plates (a hump centered between the humeri, elytral suture and postbasal band, Fig. 7A). There is often an apical or postbasal band. For a species the general position of the bands does not vary, but the smoothness of the margins and the degree that they may extend anteriorly may vary considerably. One species has completely dark elytra with the elytral pattern being formed by dark and light setae. Several species have all dark or light elytra without any setal patterns.

The pronotal horn may be abruptly darker than the remainder of the pronotum. The head is usually slightly darker or the same color as the pronotum. The light areas of the elytra are lighter than the pronotum and head, and vary from tan to brown.

Setation: The setae of the head, pronotum and elytra are often raised and their appearance is one of the best characters for recognition of species. The lengths of the raised setae of the head which outline the pronotal horn are usually highly correlated with the lengths of the raised pronotal and elytral setae, but in a few species these setae are very reduced in the male and normal in the female.

The pronotum of most species will have some setae which are raised, while for a few species all the setae are appressed. The average lengths of the raised elytral setae and their average angles from the elytral surface are characteristic for each species. The setae vary from appressed (about 8°) to decumbent (about 14°) to distinctly raised (20° to 85°).

Head: The mandibles have the peculiar lateral explanation which is a characteristic of the Notoxinae (Fig. 6). The posterior margin of the explanation may be very distinct or obsolete. The distance between the two margins in a ventral view is useful in the separation of species-groups.

The last segment of the maxillary palpus varies slightly in shape, but is best characterized as being subangulate. The length/width ratios of the antennomeres were recorded and the results from the numerical analysis indicated that the ratios of I, II, III, V-IX, X and XI were significantly different from each other for many of the species.

Pronotum: The pronotal horn provides a number of useful characters. On the pronotal horn is a shorter, median elevated area, the crest, which extends posteriorly to the pronotal disc (Fig. 5). The horn proper either has several ventro-lateral pits or lacks them completely. The horn margin may be smooth or possess up to twelve denticles or teeth. The apex is usually smooth, with the teeth being on the lateral margins or near the base. The crest usually has a smooth margin, but may have a series of sharp denticles representing the margin which will often indistinctly merge anteriorly with the horn. The crest apex varies from rounded to pointed with the apically pointed crests generally depressed anteriorly. Some species may have a smooth, median longitudinal ridge on the crest (Fig. 5).

There is a deep pubescent pit dorsal to each pronotal cervical notch. The size of these pits is stable for a species and is useful in recognizing species-groups. One species has a lateral carina on each side of the pronotum extending from the horn base to the cervix just anterior to the pronotal pits. In dorsal view the general shape of the pronotal disc is globose, but may be shortened

to appear transverse.

Elytra: Elytra of many species are distinctly widest at the middle, but a few species are only slightly wider medially and have the lateral margins of the elytra appearing almost parallel. The shape of the elytral apices is difficult to characterize except for the more extreme variations. A few species have the elytra distinctly narrowed in the apical half with the apices acuminate (Fig. 21A). In some species the females have the elytra protruding at the elytral suture (Fig. 42F) while others have the elytra somewhat shortened and truncate. Males of some species have an acute protuberance on the lateral apical angles (Fig. 50A). Males of two species have a median preapical impression which is densely setate.

Mesosternum: The lateral margins of the mesosternum vary from straight to slightly curved outwardly. The anterior margin is pointed and reaches the prothorax. The median process between the mesocoxae is narrow and truncate at the apex.

Abdomen: In the females of all but one species, the last tergite, the morphological seventh, is in the form of a broadly rounded triangle. The exception has a large apical tubercle arising from this tergite which extends beyond the elytral apices (Fig. 43F). The last sternite in the males is rounded. The morphological eighth tergite is usually barely visible between the apparent last tergite and the last sternite. In females this eighth tergite is not visible. The sternites in the females are generally unmodified with the apex varying slightly from rounded-triangular to triangular. Modifications in the male are almost always confined to the last (morphological seventh) sternite, but in one species the first four sternites may be flattened. The apex of the last sternite varies from broadly rounded to truncate to deeply emarginate. There may be an oval or transverse impression before the apex or no impression. The impression may be shallow or deep. In two cases there is a transverse carina at the center of the sternite. The apex may be straight or sharply downcurved in lateral view.

Males are best separated from females by the form of the last sternite. This sternite in the females will always be pointed to some degree and lacking in other modifications. In all males this sternite will never be simply pointed, but will be broadly rounded or have various modifications.

Legs: The first and second protarsomeres may have a distinct spur at the lateral apical margin, or these spurs may be reduced or lacking in either or both sexes. A few males have a median tubercle on the protibiae. One species has a prominent tubercle on both the pro- and mesofemora. Another species has the first tarsomere of the last leg enlarged and flattened.

Hind wings: The hind wings are usually fully developed. The wing venation did not vary in all of the species examined (Fig. 1).

Genitalia: The genitalia of the females was found to be membranous and no characters could be found which are taxonomically useful. The male genitalia are heavily sclerotized and exhibit many valuable specific characters. The parameres may have lobes at various points and vary in general shape. The median lobe or penis exhibits a variety of modifications, particularly near the apex. Before the apex there may be a dorsal notch (Fig. 52E), segments, or an oval opening. The apex may be pointed, rounded, truncate, forked, split dorso-ventrally (Fig. 13E), split laterally, with an apical hook (Fig. 50D) or with a combination of these characters. The internal sac is membranous and lacking in obvious signs of sclerotization.

Key to the Central and South American Notoxus

In the following key I have attempted to use characters which will enable the user to identify both sexes. However, several species can be positively identified using only male genitalia. Several United States species which occur near the Mexican border are included in the key as they probably will be found in the northern mountains and deserts of Mexico.

Raised elytral setae long, bristling, about two-thirds eye length (0.18-0.22), average angle 50-65°. 44

44. (43) Horn margin with 4-8 teeth; central Mexico to Sonora.
mexicanus Champion (p. 46)
 Horn margin with 1-4 teeth; northern Mexico.
apicalis LeConte (p. 44)

45. (42) With 3-8 teeth on horn margin; crest margin smooth to smoothly crenulate. 46
 With 0-2 teeth on horn margin; crest margin smooth. 49

46. (45) Postmedian band reflexed anteriorly along elytral suture (Fig. 40A); males with fifth sternite deeply emarginate, transverse impression before apex; first metatarsomere enlarged and flattened; central Mexico. opacus Champion (p. 62)
 Median band straight across elytra (Fig. 41A); males with fifth sternite slightly emarginate, oval impression before apex; metatarsomeres cylindrical. 47

47. (46) Penis apex truncate; Chiapas and Guatemala.
crucifer Champion (p. 61)
 Penis apex pointed; central Mexico to Sinaloa.
zapotecorum, n. sp. (p. 60)

48. (45) Elytra with preapical band (Fig. 13A); crest elevated well above horn; male fifth sternite slightly emarginate; northwestern Mexico. arizonensis Fall (p. 24)
 Elytra with apical band; crest and male fifth sternite variable. . . 49

49. (48) Males with apex of fifth sternite rounded, no impression before apex; mandibular explanation wide; western Texas to Arizona.
brevicornis Fall (p. 55)
 Males with apex of fifth sternite emarginate; mandibular explanation moderately wide to wide. 50

50. (49) Males with fifth sternite emarginate into large circular impression (Fig. 39B); phallobase longer than wide; Jalisco to Sonora.
stephani, n. sp. (p. 57)
 Males with transverse impression or flat before apex; phallobase wider than long; central Mexico. 51

51. (50) Penis widely forked at apex (Fig. 38D); male fifth sternite flattened; Durango. desperatus, n. sp. (p. 58)
 Penis truncate at apex; male fifth sternite variable. 52

52. (51) Male fifth sternite with transverse impression before apex.
truncatipennis Champion (p. 59)
 Male fifth sternite flattened before apex.
aztecorum, n. sp. (p. 57)

Pueblensis-group

The *pueblensis*-group is defined as those *Notoxus* with the following characters: mandibular explanation wide, prominent hind margin meeting mandible at same level as front margin; raised pronotal setae distinct, pubescent antebasal band widely separated; crest margin smooth, apex rounded and distinct, median crest usually present; elytra with median band, raised elytral setae longer than half eye length; males without lateral apical projections on elytra; fifth sternite without impression before apex; parameres with lobes or penis divided dorso-ventrally.

Central American species included are *calcaratus* Horn, *hirsutus* Champion, *pueblensis* Champion, *gelidus* n. sp. and *leonensis* n. sp. There is only one United States species in this group, *caudatus* Fall. It is included in the key to the species because it has been collected near the Mexico-New Mexico border and will probably be found in the northern montane regions of Mexico.

Notoxus pueblensis Champion

(Figs. 7, 55)

Notoxus pueblensis Champion 1890: 214, Table IX, fig. 24. Type locality: Puebla, Puebla, MEXICO, type series in BMNH. Pic 1894: 47; 1911: 11.

Length 2.78-3.48. Head and pronotum tan to red-brown, elytra tan with brown to dark brown markings: oval mark on omoplates, irregular preapical band, flanks of elytra dark posteriorly to midband. Setae brownish when arising from dark areas, whitish over rest of body. Raised setae long and erect on pronotum and elytra, average angle on elytra 64°. Mandibular explanation moderately wide, front and hind margins meeting at same level at mandible. Pronotum with antebasal pubescent band widely broken. Horn without pits beneath, 0-2 teeth on margins. Crest distinct, elevated well above horn, with short median ridge, rounded at apex. First and second protarsomeres with spur on posterior apical margin.

Males with fifth sternite emarginate at apex. Penis divided dorso-ventrally at apex. Spurs on protarsomeres small.

Females with fifth sternite rounded-triangular. Spurs on protarsomeres large and easily distinguished.

Redescribed ♂: 7 mi NE Atlixco, Puebla, MEXICO (DSC). Length 2.82. Head 0.58 long, eye 0.26 long, raised setae above eyes average 0.14 long; antennomere ratios: I 1.94, II 1.42, III 2.33, IV 1.85, V 1.86, VIII 1.60, X 1.28, XI 1.94; fourth maxillary palpus 0.20 long, 0.11 wide; mandibular explanation 0.09 long, 0.05 wide. Pronotum 0.90 long, length from base to point of greatest width 0.32, break in antebasal band 0.24 wide; horn 0.37 long, 0.27 wide at base, 1 tooth on margin; crest 0.21 long, 0.10 wide at base, with short median ridge; crest apex 0.10 above horn margin, horn apex 0.20 from crest apex; pronotal pit 0.10 long. Raised elytral setae 0.15 long, average angle 65°. Emargination of fifth sternite 0.14 wide, 0.01 deep.

Specimens examined, 31: MEXICO: Puebla: May, A. Fenyes coll. (CASC); San Martin, 26 May 1922, E. G. Smyth (USNM); Puebla, 28 May 1922, E. G. Smyth (USNM); Santa Maria, May, A. Fenyes coll. (CASC); Tehuacan, A. Fenyes coll. (CASC); 7 mi NE Atlixco, 26 July 1974, R. L. Mangan & D. S. Chandler, under low vegetation in corn field (DSC); same locality, 26 June

1975, D. S. Chandler, under low plants in corn field (DSC). Mexico: Chapingo, 22 July 1964, T. R. E. Southwood (BMNH). 1 specimen with "Mex.", F. C. Bowditch coll. (MCZC) and two specimens with "X" and "IX" (USNM).

Distribution: The semiarid region in and around the state of Puebla. Collected underneath and on vegetation in corn fields. Present from May through July.

Discussion: Very similar to *leonensis* in general appearance and form of the genitalia. It is separated by the apically narrowing parameres and its distribution in central Mexico.

Notoxus leonensis, n. sp.

(Figs. 8, 55)

Length 2.70-3.62. Head and pronotum orange, pronotum brown laterally, elytra orange with brown markings: band across omoplates interrupted at elytral suture, usually meeting median band. Pubescence brownish when arising from markings, yellowish over rest of elytra. Raised setae long and erect on pronotum and elytra, average angle on elytra 55°. Mandibular explanation moderately wide, front and hind margins meeting mandible at same level. Pronotum with antebasal pubescent band widely broken. Horn without pits beneath, 0-2 teeth on margin. Crest margin smooth, apex rounded and distinct. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite slightly emarginate. Penis divided dorso-ventrally at apex, apices bilobed.

Females with fifth sternite rounded-triangular.

♂ holotype: 18 mi SW Linares, Nuevo Leon, MEXICO. Length 3.25. Head 0.60 long, eye 0.26 long, raised setae above eyes average 0.13 long; antennomere ratios: I 2.51, II 1.91, III 2.26, IV 1.67, V 2.04, VIII 1.69, X 1.51, XI 2.42; fourth maxillary palpus 0.22 long, 0.10 wide; mandibular explanation 0.10 long, 0.04 wide. Pronotum 0.97 long, length from base to point of greatest width 0.34, break in antebasal pubescent band 0.24 wide; horn 0.38 long, 0.28 wide at base, 1 tooth on margin; crest 0.23 long, 0.08 wide at base; crest apex 0.12 over horn margin, horn apex 0.21 from crest apex; pronotal pit 0.08 long. Raised elytral setae 0.18 long, average angle 49°. Emargination of fifth sternite 0.17 wide, 0.01 deep.

Specimens examined, 5: HOLOTYPE ♂, 18 mi SW Linares, Nuevo Leon, MEXICO, 2 July 1974, Clark, Murray, Ashe, Schaffner, at light (USNM). PARATYPES: MEXICO: Nuevo Leon: 1♂, 1♀, eutopotypical (DSC, TAMU); 2♀♀, 16 mi W Linares, on Mexico 60, 2200', 26-29 May 1971, A. Newton, canyon bottom, UV trap (FGW).

Distribution: Known from the Sierra Madre Oriental in Nuevo Leon. Adults collected at light and ultra-violet light. Present in June and July.

Discussion: Very similar to *pueblensis*. Separated by the apically enlarged parameres and its distribution at the northern end of the Sierra Madre Oriental.

Notoxus gelidus, n. sp.

(Figs. 9, 55)

Length 2.81-3.69. Head and pronotum tan to red-brown, elytra tan with brown to dark brown markings: circular mark on omoplates, irregular median band, irregular preapical band which may be broken at middle. Setae brownish when arising in markings, whitish over rest of body. Raised setae long and erect on pronotum and elytra, average angle on elytra 53°. Mandibular explanation moderately wide, front and hind margins meeting at same level at mandible. Pronotum with antebasal pubescent band widely broken. Horn without pits beneath, 0-3 teeth on margins. Crest distinct, elevated well above horn, with short median ridge, widely rounded at apex. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite broadly rounded, small triangular impression at apex. Parameres with long medial flange near middle.

Females with fifth sternite rounded-triangular.

♂ holotype: Sunnyside, Arizona. Length 3.30. Head 0.68 long, eye 0.34 long, raised setae over eyes average 0.12 long, antennomere ratios: I 2.35, II 2.00, III 2.67, IV 2.23, V 2.21, VIII 2.20, X 1.76, XI 2.88; fourth maxillary palpus 0.21 long, 0.10 wide; mandibular explanation 0.08 long, 0.05 wide. Pronotum 0.95 long, length from base to point of greatest width 0.36, break in antebasal pubescent band 0.29 wide; horn 0.35 long, 0.24 wide at base, one tooth on margin; crest 0.15 long, 0.13 wide at base, with short median ridge; crest apex 0.15 over horn margin, horn apex 0.23 from crest apex; pronotal pit 0.10 long. Elytra with raised setae 0.16 long, average angle 56°.

Specimens examined, 33: HOLOTYPE ♂, Sunnyside, Cochise County, Arizona, 27 August 1973, K. Stephan (CNCI). PARATYPES: Arizona: Cochise Co.: 5♂♂, 4♀♀, eutopotypical (DSC, KSC); 1♂, Sunnyside, 20 June 1970, K. Stephan (DSC). Chiricahua Mountains - 1♂, 6000', 29 June 1968, K. Stephan (DSC); 1♂, 2♀♀, 26 July 1952, D. J. & J. N. Knull (OSUC); 1♂, Turkey Creek Camp, 6400', 14 June 1964, J. Burger, UV light (FGW); 1♂, Southwest Research Station, 5 mi W Portal, 1 September 1959, J. R. Powers, at light (CISC); same locality, 1♂, 4 August 1961, J. M. Linsley (CISC); same locality, 1♂, 5 August 1967, F. G. Andrews and 1♀, 28 August 1967, F. G. Andrews (CDAE); 1♂, Stewart Camp, 1 mi S Portal, 18-20 July 1971 (CISC). Huachuca Mountains - 1♀, Miller Canyon, 2.7 mi W parking area, 5800', 6 June 1964, J. Burger, UV light (FGW); same locality, 1♀, 5700', 10 August 1974, D. S. Chandler (DSC); 1♀, Ramsey Canyon, 13 July 1955, F. G. Werner & G. D. Butler (FGW). Santa Cruz Co.: 1♀, Madera Canyon, 9 August 1961, Werner & Nutting, UV light (FGW); 1♀, same locality, 4880', 25 September 1963, V. L. Vesterbey (UCDC); 1♂, same locality, 2 September 1960, F. G. Andrews (CDAE); 1♂ same locality, 8 September 1970, E. A. Kane, UV light (CDAE). MEXICO: Sonora: 1♀, Sierra del Ajos, Canyon de Evans, 15 July 1970, V. Roth (DSC). Durango: 2♂♂, 26 mi W Durango, 13 July 1974, R. L. Mangan & D. S. Chandler, beating oak (DSC).

Distribution: Montane areas in southern Arizona south through the Sierra Madre Occidental. Apparently associated with the oak zone. Karl Stephan noted that a portion of the type series was collected on a cold night at light, while little else was attracted. Present from June through September.

Discussion: Most similar to *pueblensis* and *leonensis* in appearance. Distinct by its high, almost semicircular crest and the medial flanges on the parameres.

Notoxus hirsutus Champion

(Figs. 10, 55)

Notoxus hirsutus Champion 1890: 211, Table IX, fig. 20. Type locality: near Mazatlan, Sinaloa, MEXICO, BMNH Lectotype ♀, designated by Chandler, 1975. Pic 1894: 47; 1911: 8. Not Pallister 1955: 10.

Notoxus cristatus Champion 1890: 213-4, Table IX, fig. 23. Type localities: Guanajuato, Guanajuato, and Cuernavaca, Morelos, MEXICO, type series in BMNH and F. G. Werner collection. Pic 1894: 46; 1911: 7. Pallister 1955: 10, in part. NEW SYNONYMY.

Length 2.95-3.70. Head and pronotum tan to dark reddish-brown, elytra tan with brown markings: oval mark on omoplates, irregular median band, irregular preapical band, marks on flanks behind humeri in few specimens. Pubescence brownish when originating in darkened areas, whitish over rest of body. Raised setae long and erect on pronotum and elytra, average angle on elytra 70°. Mandibular explanation wide, with front and hind margins meeting at same level at mandible. Pronotum with pubescent antebasal band widely broken. Horn with pits beneath, 1-8 teeth on margin. Crest elevated and distinct, apex rounded, usually with distinct median ridge. First and second protarsomeres with strong spur on posterior apical margin.

Male with circular impressed area near apex of elytron, densely setate. Fifth sternite slightly emarginate at apex. Penis split dorso-ventrally, with dorsal part bilobed at apex.

Female without setate impressed area on elytron, fifth sternite rounded-triangular.

Redescribed ♂: 2 mi N Jojutla, Morelos, MEXICO (DSC). Length 3.50. Head 0.75 long, eye 0.34 long, raised setae over eyes average 0.20 long; antennomere ratios: I 2.30, II 1.69, III 2.20, IV 1.94, V 1.79, VIII 1.58, X 1.35, XI 2.39; fourth maxillary palpus 0.24 long, 0.12 wide; mandibular explanation 0.08 long, 0.06 wide. Pronotum 1.16 long, length from base to point of greatest width 0.38, break in antebasal pubescent band 0.25 wide; horn 0.46 long, 0.38 wide at base, 2 teeth on margin; crest length 0.25, width at base 0.12, with median ridge; crest apex 0.15 above horn margin, crest apex 0.24 from horn apex; pronotal pit 0.14 long. Raised elytral setae 0.22 long, average angle 71°. Emargination of fifth sternite 0.18 wide, 0.01 deep.

Specimens examined, 79: MEXICO: Chihuahua: Ciudad Jimenez; Catarinas, 5800'. Durango: Rio Florida, nr. Las Nieves, 5200'. Sinaloa: Presidio (Mazatlan), Forrer, Lectotype female of *hirsutus* (BMNH); 5.5 mi NW Choix. Nayarit: Arroyo Santiago, nr. Jesus Maria. Zacatecas: 28 mi S Jalpa. San Luis Potosi: Tamazunchale, Rt. 1, km. 365; 1 mi SW Tamazunchale. Queretaro: 1 mi NW Ayutla. Guanajuato: Guanajuato, type of *cristatus*; Silao. Guerrero: Xalitla; 17 mi E Acapulco. Morelos: 2 mi N Jojutla; Cuernavaca, type of *cristatus*; 3 mi N Alpuyeca, 3400'. Puebla: Tepexco, Rt. 115, 4000'; 12 mi SE Izucar de Matamoros. Oaxaca: Oaxaca; Yagul ruins; 10 mi N Miltepec. Chiapas: 31 mi SE Comitan; 29 mi SW Cintalapa. Specimens present in collections of: AMNH, BMNH, CDAE, CISC, CUIC, DSC, FGW, TAMU, UCDC.

Distribution: From New Mexico through most of Mexico. Specimens have been collected by beating vegetation and are attracted to ultra-violet light and cantharidin. Present from February through August.

Discussion: *Hirsutus* is most similar to *caudatus* Fall, which also has the setate impressions on the male elytra. *N. hirsutus* can be separated from *caudatus* and the others in the group by the very irregular midband. *N. caudatus* males have a deeply emarginate fifth sternite and an apically pointed fifth tergite, which will also separate this species from the others in the group. The size of the elytral impression appears to diminish in a northerly direction as the specimens of *hirsutus* from New Mexico have the impressions small and easily overlooked in a quick examination.

Notoxus calcaratus Horn

(Figs. 11, 55)

Notoxus calcaratus Horn 1884: 170-1. Type locality: Arizona, MCZC type #3041, ♂. Champion 1890: 211, Table IX, fig. 21. Pic 1894: 46; 1911: 6. Casey 1895: 759. Leng 1920: 163. Pallister 1955: 9.

Length 2.65-4.15. Head and pronotum tan, elytra tan with brown markings: circular mark on omoplates, irregular midband and band at apex. Pubescence brownish when arising in markings, whitish over rest of body. Raised setae long and erect on pronotum and elytra, average angle on elytra 71°. Mandibular explanation wide, with front and hind margins meeting at same level at mandible. Pronotum with antebasal pubescent band widely broken. Horn with pits beneath, 3-8 teeth on margin. Crest elevated and distinct, usually with distinct median ridge, rounded at apex. First and second protarsomeres with strong spur on posterior apical margin.

Male protibiae with medial tooth on proximal margin, fifth sternite truncate at apex, triangularly impressed anteriorly from apex. Parameres with outer lobe near apex and strong outer angulations at apex.

Female without modifications of the protibiae, fifth sternite rounded-triangular.

Redescribed ♂: 3 mi N La Puerta, Baja California, MEXICO (DSC). Length 4.00. Head 0.74 long, eye 0.28 long, raised setae over eyes average 0.29 long; antennomere ratios: I 2.50, II 2.00, III 2.20, IV 2.13, V 2.33, VIII 1.84, X 1.65, XI 2.64; fourth maxillary palpus 0.24 long, 0.13 wide; mandibular explanation 0.14 long, 0.08 wide. Pronotum 1.28 long, length from base to point of greatest width 0.42, break in antebasal pubescent band 0.31 wide; horn 0.54 long, 0.46 wide at base, 4 teeth on margin; crest 0.32 long, 0.08 wide at base, with median ridge; crest apex 0.22 above horn margin, horn apex 0.38 from crest apex; pronotal pit 0.15 long. Raised elytral setae 0.30 long, average angle 70°. Truncation of fifth sternite 0.22 wide.

Specimens examined, 217: MEXICO: Baja California: 3 mi N La Puerta; Rancho El Topo, 3 mi NE Sierra Juarez; 26 mi S San Felipe. Baja California Sur: 15 mi N San Ignacio; 3 mi W San Miguel de Comondú; 10 mi SW San Jose del Cabo; 6 mi N San Jose del Cabo; 6 mi SW Santiago; 4 mi N Todos Santos; La Paz; 12 mi NW La Paz; 3.5 mi NE San Pedro. Sonora: Alamos; 10 mi N Santa Ana; Saric; Rancho La Floresta, 8 mi E Tastiota; Imuris; 10 mi NE Cananea; Navojoa; 20 mi NNE Obregon; 4 mi NE Altar; 2 mi E Huatabampo. Sinaloa: Los Mochis; 5.5 mi NW Choix; Wollamo. Chihuahua: 12 mi N Escalon; Ciudad Jimenez; 5 mi N Matamoros; Delicias; 6 mi NE Meoqui; Buena

Vista; Samalayuca; Catarinas; Valle de Olivos; Primavera; Santa Clara Canyon, 5 mi W Parrita; 11 mi W Gran Morelos; Rio Conchos, 2 km W Oginaga. Durango: 26 mi W Durango; Tepehuanes; 25 mi NE Bermejillo; 2 mi N Cerro Gordo; 2 mi NW Nombre de Dios; Sombrerte; Gomez Palacio; 11 mi W Cuencame. Zacatecas: 16 mi NW Fresnillo; 15 mi NE Fresnillo. Coahuila: Boquillas del Carmen. Nuevo Leon: Monterrey; 5 mi S Monterrey. Specimens present in collections of: AMNH, CISC, DSC, FGW, LACM, MSUC, TAMU, TTCC, USNM.

Distribution: Throughout the southern half of the United States and south into the northern semiarid portions of Mexico. Specimens have been collected on *Opuntia invicta* flowers, *Prosopis*, *Hoffmannseggia*, cotton, under low plants in corn fields and are attracted to white light, ultra-violet light and drying meloid beetles. This species is fairly common on cotton and is of some economic importance in that it will eat the eggs of lepidopterous pests. Present in Mexico from April through September.

Discussion: This species and *hirsutus* are the only species in the group with lateral pits on the ventral surface of the horn. Only *calcaratus* has the medial tooth on the protibiae of the males. The smooth median band on the elytra will separate this species from similar appearing species of the *monodon*-group, which also have the pits beneath the horn.

Montanus-group

The *montanus*-group is defined as those *Notoxus* with the following characters: mandibular explanation wide; raised pronotal setae distinct, pubescent antebasal band widely broken; horn without median ridge, lacking pits beneath horn; raised elytral setae distinct and elevated, elytra with slightly postmedian band. Males with simple elytra; protibiae with a median tubercle; fifth sternite emarginate, without impressions; penis either dorsoventrally or laterally split at apex.

Three United States species are included: *montanus* Casey, *intermedius* Fall and *schwarzi* Horn. Of these species *montanus* occurs in the montane regions of eastern Arizona and probably occurs in northern Mexico. The other two species are found from the upper Sonoran desert of California to Alberta, Canada. *N. montanus* is separated in the key to species.

Arizonensis-group

The *arizonensis*-group is defined as those *Notoxus* with the following characters: mandibular explanation moderately wide, hind margin meeting mandible at lower level than front margin; raised pronotal setae distinct, pubescent antebasal band widely broken; horn without lateral pits, crest margin smooth, apex rounded, no median ridge; raised elytral setae slightly longer than other setae; males with simple elytra and legs, fifth sternite truncate to slightly emarginate; parameres simple, penis divided dorso-ventrally through apical half, dorsal thorn at apex.

Central American species included are *arizonensis* Fall, *durangoensis* n. sp., *nubilus* n. sp. and *toltecorum* n. sp. One United States species, *N. balteatus* Casey, is included. It has been most commonly collected in Arizona near the Mexico border and probably occurs in northern Mexico. For this reason it is separated in the key to species.

Notoxus arizonensis Fall
(Figs. 13, 39)

Notoxus arizonensis Fall 1916: 36-7. Type locality: Chiricahua Mountains, Cochise Co., Arizona. MCZC type #24326, ♂. Leng 1920: 163. *Notoxus talpa*, Pallister 1955: 7, misidentification.

Length 3.30-4.00. Head and pronotum orange to red-brown, elytra tan to orange with brown markings: oval mark covering omoplates, median band rarely connected to mark on omoplates, preapical band often advancing anteriorly along elytral suture, rarely meeting median band. Pubescence brownish when arising from markings, whitish over rest of body. Raised setae moderately long and distinct on pronotum and elytra, average angle on elytra 31°. Mandibular explanation moderately wide, hind margin meeting mandible at lower level than front margin. Pronotum with pubescent antebasal band widely broken. Horn without pits beneath, 0-2 teeth on margin. Crest margin smooth. Apex rounded and distinct. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite slightly emarginate or often appearing only truncate. Penis split dorso-ventrally near apex, with dorsal thorn at apex.

Females with fifth sternite rounded-triangular.

Redescribed ♂: Nogales, Santa Cruz Co., Arizona (DSC). Length 3.31. Head 0.68 long, eye 0.24 long, raised setae over eyes average 0.14 long; antennomere ratios: I 2.75, II 1.67, III 2.25, IV 1.69, V 1.93, VIII 1.44, X 1.20, XI 2.11; fourth maxillary palpus 0.18 long, 0.09 wide; mandibular explanation 0.11 long, 0.05 wide. Pronotum 1.08 long, length from base to point of greatest width 0.34, break in antebasal pubescent band 0.30 wide; horn 0.46 long, 0.32 wide at base, 1 tooth on margin; crest 0.32 long, 0.13 wide at base; crest apex 0.11 above horn margin, horn apex 0.21 from crest apex; pronotal pit 0.08 long. Raised elytral setae 0.11 long, average angle 33°. Truncation of fifth sternite 0.15 wide.

Specimens examined, 17: MEXICO: Chihuahua: Chihuahua, Wickham (MCZC); Primavera, 550-6000', 30 June 1947, Cazier (AMNH); Santa Clara Canyon, 5 mi W Parrita, 6 July 1954, J. W. MacSwain, *Baccharis* (CISC); same locality and collector, 1 September 1956, *Salix* (CISC). Nayarit: La Mesa de Navarit, 19 July 1955, B. Malkin (CISC).

Distribution: Southeastern Arizona south through the Sierra Madre Occidental. Collected on *Baccharis* and *Salix*. Adults present from June through August.

Discussion: Most similar to *durangoensis* and *nubilus* by the form of the genitalia. Separated from them by the raised elytral setae and the largely light elytra. The lack of a postbasal band separates it from *toltecorum* and *balteatus*.

Notoxus durangoensis, n. sp.
(Figs. 14, 59)

Length 2.78-4.35. Head and pronotum brown, elytra brown, rarely with faint postbasal and preapical lateral markings. Pubescence whitish over body. Raised setae distinct on pronotum, on elytra setae appressed, average angle 8°. Mandibular explanation moderately wide, hind margin meeting mandible at lower level than front margin. Pronotum with pubescent antebasal band widely broken. Horn without pits beneath, 0-1 teeth on margin. Crest margin smooth, apex rounded and distinct. First and second protarsomeres with

strong spur on posterior apical margin.

Males with fifth sternite slightly emarginate. Penis with apex divided dorso-ventrally, with dorsal thorn at apex.

Females with fifth sternite rounded-triangular.

♂ holotype: 25 mi W Durango, Durango, MEXICO. Length 3.63. Head 0.75 long, eye 0.26 long, raised setae above eyes average 0.10 long; antenno-mere ratios: I 2.50, II 1.72, III 2.14, IV 1.80, V 1.88, VIII 1.56, X 1.53, XI 2.37; fourth maxillary palpus 0.20 long, 0.12 wide; mandibular explanation 0.14 long, 0.05 wide. Pronotum 1.16 long, length from base to point of greatest width 0.34, break in antebasal pubescent band 0.26 wide; horn 0.52 long, 0.32 wide at base, no teeth on margin; crest 0.26 long, 0.14 wide at base; crest apex 0.12 above horn margin, horn apex 0.29 from crest apex; pronotal pit 0.10 long. Elytral setae 0.08 long, average angle 10°. Emargination of fifth sternite 0.20 wide, 0.01 deep.

Specimens examined, 49: HOLOTYPE ♂, 25 mi W Durango, 29 June 1964, H. F. Howden (CNCI). PARATYPES: MEXICO: Durango: 2♂♂, 10♀♀, eutopotypical (CNCI); 5♂♂, 6♀♀, same data except 23 June 1964 (CNCI); 1♂, 6♀♀, 10 mi W El Salto, 29 June 1964, H. F. Howden (CNCI); 1♂, same data except 23 July 1964 (CNCI).

Distribution: Only known from the Sierra Madre Occidental in Durango. Adults present in June and July.

Discussion: Most similar to *nubilus* by the appressed elytral setae and the general form of the genitalia. It can be separated by the larger dorsal thorn on the penis. Distinct in the group by the unicolorous elytra which rarely have faint light lateral markings.

Notoxus nubilus, n. sp.

(Figs. 15, 59)

Length 2.88-3.48. Head brown, pronotum orange, elytra red-brown with brown markings: basal, medial and preapical bands, basal band interrupted along elytral suture. Pubescence brownish when arising from bands, whitish over rest of body. Raised setae distinct on pronotum, setae on elytra appressed, average angle 6°. Mandibular explanation moderately wide, hind margin meeting mandible at lower level than front margin. Pronotum with pubescent antebasal band widely broken. Horn without pits beneath, 1 tooth on margin. Crest margin smooth, apex distinct, usually rounded. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite truncate. Penis with apex divided dorso-ventrally, with dorsal thorn at apex.

Females with fifth sternite rounded-triangular.

♂ holotype: 24 mi W La Ciudad, Durango, MEXICO. Length 3.23. Head 0.67 long, eye 0.22 long, raised setae over eyes average 0.08 long; antenno-mere ratios: I 2.33, II 1.64, III 2.27, IV 1.77, V 1.60, VIII 1.50, X 1.28, XI 2.06; fourth maxillary palpus 0.15 long, 0.10 wide; mandibular explanation 0.10 long, 0.04 wide. Pronotum 0.96 long, length from base to point of greatest width 0.28, break in antebasal pubescent band 0.24 wide; horn 0.40 long, 0.25 wide at base; crest 0.20 long, 0.10 wide at base, apex pointed; crest apex 0.08 above horn margin, horn apex 0.24 from crest apex; pronotal pit 0.08 long. Elytral setae 0.07 long, average angle 5°. Truncation of fifth sternite 0.20 wide.

Specimens examined, 3: HOLOTYPE ♂, 24 mi W La Ciudad, Durango, MEXICO, 4 June 1964, H. F. Howden (CNCI). PARATYPES: MEXICO: Durango: 1♂, 1♀, 24 mi W La Ciudad, 30 July 1964, H. F. Howden (CNCI, DSC).

Distribution: Only known from the Sierra Madre Occidental in Durango. Adults present from June through July.

Discussion: Similar to *toltecorum* and *balteatus* by the banding on the elytra, but most similar to *durangoensis* by the form of the genitalia. Separated from *durangoensis* by the faint bands on the elytra, the light pronotum and the narrow thorn at the penis apex. Separated from the other species by the more slender genitalia.

N. nubilus may be a population of *durangoensis* with larger light elytral markings, but the genitalic differences, although slight, have been consistent in the specimens examined.

Notoxus toltecorum, n. sp.

(Figs. 16, 59)

Length 2.82-3.50. Head and pronotum orange to brown, elytra orange to tan with brown markings: basal, median and preapical bands, basal band usually interrupted at elytral suture. Pubescence brownish when arising from marks, whitish over rest of elytra. Raised setae distinct on pronotum, on elytra appressed, average angle 10°. Mandibular explanation moderately wide, hind margin meeting mandible at lower level than front margin. Pronotum with pubescent antebasal band widely broken. Horn without pits beneath, 0-1 teeth on margin. Crest margin smooth, apex distinct, usually rounded. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite truncate. Penis with apex divided dorso-ventrally, with dorsal thorn at apex.

Females with fifth sternite rounded-truncate.

♂ holotype: 6 mi NE Zacatepec, Puebla, MEXICO. Length 3.30. Head 0.70 long, eye 0.24 long, raised setae above eyes average 0.10 long; antennomere ratios: I 2.50, II 1.82, III 2.09, IV 1.54, V 1.65, VIII 1.28, X 1.32, XI 2.00; fourth maxillary palpus 0.18 long, 0.10 wide; mandibular explanation 0.12 long, 0.05 wide. Pronotum 1.07 long, length from base to point of greatest width 0.32, break in antebasal pubescent band 0.30 wide; horn 0.46 long, 0.28 wide at base, no teeth on margin; crest 0.28 long, 0.11 wide at base, apex pointed; crest apex 0.08 above horn margin, horn apex 0.24 from crest apex; pronotal pit 0.08 long. Elytral setae 0.08 long, average angle 10°. Truncation of fifth sternite 0.18 wide.

Specimens examined, 13: HOLOTYPE ♂, 6 mi NE Zacatepec, Puebla, MEXICO, 27 June 1975, D. S. Chandler, meloid trap (USNM). PARATYPES: MEXICO: Durango: 1♂, Palos Colorados, 8000', 5 August 1947, Schramel (AMNH). Distrito Federal: 1♀, Valley of Mexico, July 1929, Y. Mexia (CASC). Puebla: 3♂♂, 2♀♀, eutopotypical (DSC); 3♀♀, same data except cantharidin trap (DSC); 2♀♀, same data except sweeping vegetation (DSC).

Distribution: Montane areas of central and west Mexico. Adults collected sweeping vegetation, and are attracted to cantharidin and freshly killed meloid beetles. Present from June through August.

Discussion: Most similar to *balteatus* Casey by the trifasciate elytra and the general form of the genitalia. It is separated by the abruptly swollen ventral portion of the penis apex and the apically thickened parameres.

Eximius-group

The *eximius*-group is defined as those *Notoxus* with the following characters: mandibular explanation wide, the hind margin prominent; setae on pro-

notum usually appressed, pubescent antebasal band widely broken, crest without median ridge, margin variable; elytra with median band, elytra narrowed in apical half, apices often acuminate. Males without modified elytra; fifth sternite truncate to slightly emarginate; penis simple.

The species included are *eximius* Champion, *lateralis* n. sp., *impressus* Champion, *solus* n. sp. and *acuminatus* Champion.

There is also an undescribed species known from the southwestern United States.

Notoxus eximius Champion
(Figs. 18, 56)

Notoxus eximius Champion 1890: 206-7, Table XI, fig. 15. Type localities:

GUATEMALA: near Guatemala City; Duenas; Zapote. NICARAGUA: Chinandega. PANAMA: Tolé. Types in BMNH, FGW, MCZC.

Pallister 1955: 6.

Notoxus solarii (sic) Pic 1916: 11. Type locality: NICARAGUA.

NEW SYNONYMY.

Length 2.07-2.95. Head and pronotum reddish-brown to dark brown, elytra brown to dark brown with tan to light brown markings: thin, light band across base of elytra, posthumeral band from lateral margin inward and posterior to near elytral suture, postmedian light band curving anteriorly from lateral margins to near suture, in lighter specimens these bands join to form outward facing semicircles. Pubescence white when arising from markings, rest of pubescence on elytra brownish. Setae on pronotum and elytra appressed, on elytra average angle 5°. Mandibular explanation wide, with front and hind margins on same level at mandible. Pronotum with antebasal pubescent band widely broken. Horn without pits beneath, 6-10 teeth on margin. Crest crenulate, anterior margin pointed and indistinct. First and second protarsomeres lacking strong spur on posterior apical margin. Elytra slightly narrowed in apical half.

Males with fifth sternite emarginate at apex, with very short raised setae above eyes, average length 0.02. Parameres with lateral protuberances near apex.

Females with fifth sternite narrowed to apex, with raised setae above eyes averaging 0.12.

Redescribed ♂: 6 km San Jose, San Jose Province, COSTA RICA (DSC). Length 2.54. Head 0.55 long, eye 0.18 long, raised setae over eyes average 0.02 long; antennomere ratios: I 2.00, II 1.67, III 2.56, IV 1.90, V 2.00, VIII 1.33, X 1.19, XI 2.14; fourth maxillary palpus 0.18 long, 0.09 wide; mandibular explanation 0.08 long, 0.05 wide. Pronotum 0.88 long, length from base to point of greatest width 0.32, break in antebasal pubescent band 0.20 wide; horn 0.34 long, 0.22 wide at base, 6 teeth on margin; crest 0.24 long, 0.10 wide at base; crest apex 0.02 above horn margin, horn apex 0.12 from crest apex; pronotal pit 0.10 long. Elytral setae 0.06 long, average angle of setae 6°. Emargination of fifth sternite 0.18 wide, 0.04 deep.

Specimens examined, 362: MEXICO: Ixtlan del Rio. Morelos: 2 mi N Jojutla; Xochitepec. Tamaulipas: Matamoros. Veracruz: Alvarado; Veracruz; Tampico; Laguna Verde. Oaxaca: La Ventosa, 72 mi E Oaxaca. GUATEMALA: Zapote, types of *eximius*; Yepocapa; Gualan; Los Amates; El Rancho. HONDURAS: La Ceiba; 12 km W Olanchito. EL SALVADOR: La Libertad; Cerro Verde; San Salvador. NICARAGUA: San Marcos. COSTA RICA: San Jose, 6 km NW San Jose, Rio Virilla; San Pedro de Montes de Oca. PANAMA: Tolé, part of type series (not seen). Present in all collections.

Distribution: From the neotropical portions of Mexico through central

America. Found throughout the year on a variety of plants (*Cordia alba*, *Sechium edrile*, *Inga edulis*, *Musa paradisiaca*, *Citrus* sp.). Collected by beating vegetation, sweeping shrubs on beach, and is attracted to light.

Discussion. It is the most similar to *lateralis* by the crenulate crest merging into the horn and the elytral pattern. Separated from *lateralis* by all the elytral setae being directed posteriorly.

Notoxus lateralis, n. sp.

(Figs. 19, 56)

Length 2.30-2.91. Head, pronotum and markings on elytra reddish-brown to dark brown, remainder of elytra tan; thin mark arising near humeri passing over omoplates and joining irregular midband near elytral suture, preapical band often incomplete. Pubescence brownish when arising from dark portions of elytra, yellowish in light areas. Setae on pronotum and elytra appressed, on elytra average angle 7°. Mandibular explanation wide, with front and hind margins on same level at mandible. Pronotum with antebasal pubescent band widely broken. Horn without pits beneath, 5-9 teeth on horn margin. Crest serrate, anterior margin usually pointed and indistinct. First and second protarsomeres lacking strong spur on posterior apical margin. Elytra narrowed in apical half.

Males with fifth sternite emarginate at apex, very short raised setae above eyes, average length 0.02.

Females with fifth sternite triangular, raised setae over eyes longer, average length 0.03.

♂ holotype: 5 mi N Cuernavaca, Morelos, MEXICO. Length 2.56. Head 0.54 long, eye 0.17 long, raised setae over eyes average 0.02 long; antenno-mere ratios: I 2.00, II 1.89, III 2.10, IV 2.40, V 2.00, VIII 1.40, X 1.33, XI 2.13; fourth maxillary palpus 0.18 long, 0.10 wide; mandibular explanation 0.10 long, 0.06 wide. Pronotum 0.90 long, length from base to point of greatest width 0.32, break in antebasal pubescent band 0.27 wide; horn 0.34 long, 0.22 wide at base, 6 teeth on margin; crest 0.20 long, 0.08 wide at base; crest apex at same level as horn margin, horn apex 0.14 from crest apex; pronotal pit 0.10 long. Elytral setae 0.06 long, average angle of setae 5°. Emargination of fifth sternite 0.19, 0.02 deep.

Specimens examined, 46: HOLOTYPE ♂, 5 mi N Cuernavaca, Morelos, MEXICO, 28 August 1958, H. F. Howden (CNCI). PARATYPES: MEXICO: Nayarit: 4♂♂, 3♀♀, San Blas, 6 October 1964, W. L. Nutting, at light 200 yards from beach (FGW); 4♀♀, same locality, 5 July 1972, K. Stephan (KSC). Michoacan: 5♂♂, 9♀♀, Uruapan, 10 August 1949, L. J. Bottimer (CNCI); 1♀, Tancitaro, 6000', 27 June 1941, H. Hoogstraal (FMNH). Mexico: 1♀, Real de Arriba, Temescaltepec, 6-7000', 1932 (BMNH). Morelos: 1♀, Cuernavaca, 12/19 July 1961, R. & K. Driesbach (MSUC); 1♀, eutopotypical, beating oak (CNCI); 7♀♀, 7 mi S Tres Cumbres, 7 July 1975, D. S. Chandler, cantharidin trap (DSC). San Luis Potosi: 1♂, Xilitla, 23 July 1954, R. R. Driesbach (MSUC). Veracruz: 1♀, El Palmar, 16 km W Tetzonapa, 600', 9/15 June 1948, F. Werner & W. Nutting, jungle rubber area, beaten from vegetation (FGW). Chiapas: 1♂, 2♀♀, Junction Highways 190-195, 6 June 1969, H. F. Howden (CNCI). No state, 1♂, 1♀, Texpan, 7500', 12 August 1954, R. R. Driesbach (MSUC). GUATEMALA: 1♀, Escuintla Tiquisate, 7 km from coast near Junction Zanjones del Mico de Noria, 8 May 1956, T. H. Hubbell (UMMZ). COLOMBIA: 1♀, Rio Frio, Magdalena, Darlington (MCZC).

Distribution: Through neotropical Central America to Colombia. This species has been collected by beating oak and vegetation, and is attracted to light and cantharidin. Present from May through October.

Discussion: It is most similar to *eximus*, but it can be separated by the presence of the laterally directed setae in the elytral postbasal impression. The crenulate crest separates it from *solus*, the other species with laterally directed setae.

Notoxus solus, n. sp.

(Figs. 20, 56)

♂ holotype: 10 mi S Catavina, Baja California, MEXICO. Head and pronotum tan, elytra tan with brown markings: thin band at base of elytra, smooth median band, wide apical band. Pubescence brownish when arising from dark areas, tan over rest of body. Setae on pronotum and elytra appressed, on elytra average angle 10°. Mandibular explanation moderately wide, with front and hind margins on same level at mandible. Pronotum with pubescent antebasal band widely broken. Horn without pits beneath, 2 teeth on horn margin. Crest margin smooth, anterior margin pointed and distinct. First and second protarsomeres with strong spur on posterior apical margin. Elytra narrowed in apical half.

Male with fifth sternite emarginate.

Length 2.64. Head 0.62 long, eye 0.18 long, raised setae over eyes average 0.14 long; antennomere ratios: I 2.33, II 1.90, III 2.00, IV 2.00, V 2.10, VIII 1.73, X 1.05, XI 1.95; fourth maxillary palpus 0.20 long, 0.12 wide; mandibular explanation 0.12 long, 0.06 wide. Pronotum 1.00 long, length from base to point of greatest width 0.30, break in antebasal pubescent band 0.26 wide; horn 0.40 long, width at base 0.24; crest 0.30 long, 0.15 wide at base; crest apex 0.04 above horn margin, horn apex 0.15 from crest apex; pronotal pit 0.06 long. Elytral setae 0.08 long. Emargination of fifth sternite 0.14 wide, 0.01 deep.

Specimens examined, 1: HOLOTYPE ♂, 10 mi S Catavina, Baja California, MEXICO, 29 July 1938, Michelbacher & Ross (CASC).

Distribution: The single specimen is known from the southern portion of Baja California.

Discussion: Most similar to an undescribed species from Arizona by the laterally directed setae in the elytral postbasal impression and the smoothly margined crest. It can be separated by the apex of the fifth sternite being emarginate rather than bisinuate.

Notoxus impressus Champion

(Figs. 21, 56)

Notoxus impressus Champion 1890: 206, Table IX, fig. 14. Type series localities: GUATEMALA: Aceytuno; Guatemala City; Capetillo. Type series in BMNH and FGW. Pic 1874: 47; 1911: 8.

Length 1.62-3.18. Head and pronotum reddish-brown to dark brown, elytra tan with brown markings: omoplates dark, in some specimens with irregular midband proceeding anteriorly along elytral suture to join mark on omoplates, mark on flanks of humeri joining midband, wide apical band. Pubescence brownish when arising from marks on elytra, yellowish in lighter areas. Setae on elytra and pronotum appressed, on elytra average angle 10°. Mandibular explanation wide, with front and hind margins on same level at mandible. Pronotum with antebasal pubescent band widely broken. Horn

without pits beneath, 6-9 teeth on horn margin. Crest crenulate, anterior margin pointed and indistinct. First and second protarsomeres lacking strong spur on apical posterior margin. Elytra narrowed in apical half.

Males with fifth sternite emarginate, slightly bisinuate, transverse depression immediately anterior to apical margin. Penis acutely pointed at apex.

Females with fifth sternite rounded-triangular.

Redescribed ♂: Cerro Verde, EL SALVADOR (DSC). Length 3.24. Head 0.68 long, eye 0.25 long, raised setae over eyes average 0.12 long; antennomere ratios: I 2.28, II 1.67, III 2.50, IV 2.50, V 2.23, VIII 2.33, X 1.50, XI 1.94; fourth maxillary palpus 0.21 long, 0.12 wide; mandibular explanation 0.12 long, 0.07 wide. Pronotum 1.10 long, length from base to point of greatest width 0.38, break in antebasal pubescent band 0.25 wide; horn 0.48 long, 0.28 wide at base, 6 teeth on margin; crest 0.32 long, 0.12 wide at base; crest apex 0.01 above horn margin, horn apex 0.07 from crest apex; pronotal pit 0.14 long. Elytral setae 0.07 long, average angle 14°. Emargination of fifth sternite 0.18 wide.

Specimens examined, 14: GUATEMALA: Capetillo, G. C. Champion, paratype (FGW); Finca San Rafael, Sacatepeque, 6900', 28 June 1948, R. D. Mitchell (FMNH). EL SALVADOR: Cerro Verde, 6800', 29 June 1963, D. Q. Cavagnaro & M. E. Irwin (CASC); same locality, 18 June 1958, L. J. Bottimer (USNM); same locality, 2000 meters, 1 May 1971, H. F. Howden (CNCI).

Distribution: The central plateau in Guatemala and El Salvador. Present from May to June.

Discussion: It is actually quite distinct in appearance, but keys to near *eximius* by the crenulate crest merging into the horn. It can be separated by the sparse setae on the elytra, the more acuminate elytral apices and the complete postmedian light band.

Notoxus acuminatus Champion

(Figs. 22, 56)

Notoxus acuminatus Champion 1890: 210-11, Table IX, fig. 19. Type locality: Quezaltenango, 7800', GUATEMALA. BMNH. Lectotype ♂, designated by Chandler 1975. Pic 1894: 46; 1911: 5.

Length 3.05-3.80. Head and pronotum tan to brown, elytra tan with brown markings: oval marks on omoplates, often connected to irregular midband along elytral suture, preapical band present with apices tan, mark beneath humeri on flanks. Pubescence brownish when arising from dark areas, yellowish over rest of body. Raised setae long and erect on pronotum and elytra, average angle on elytra 42°. Mandibular explanation wide, with front and hind margins at same level at mandible. Pronotum with pubescent antebasal band widely separated. Horn with pits beneath, 5-9 teeth on margins. Crest crenulate, pointed at apex, anterior margin indistinct. Elytra narrowed in apical half.

Males with fifth sternite widely emarginate at apex, with transverse ridge across center. Penis short, with apex slightly split into lateral parts. Lacking strong spur on posterior apical margin of first and second protarsomeres. Protibia with medial spine near middle.

Females with fifth sternite triangular, with median longitudinal ridge; first and second protarsomeres with strong spur on posterior apical margin.

Redescribed male: Junction of Highways 190 & 195, Chiapas, MEXICO

(DSC). Length 3.79. Head 0.79 long, eye 0.28 long, raised setae over eyes average 0.19 long; antennomere ratios: I 2.65, II 1.50, III 2.33, IV 2.26, V 2.12, VIII 1.89, X 1.47, XI 2.03; fourth maxillary palpus 0.24 long, 0.12 wide; mandibular explanation 0.12 long, 0.07 wide. Pronotum 1.28 long, length from base to point of greatest width 0.50, break in antebasal pubescent band 0.29 wide; horn 0.52 long, 0.39 wide at base, 6 teeth on margin; crest 0.32 long, 0.13 wide at base; crest apex 0.20 above horn margin, horn apex 0.18 from crest apex; pronotal pit 0.12 long. Raised elytral setae 0.18 long, average angle 32°. Emargination of fifth sternite 0.22 wide, 0.02 deep.

Specimens examined, 32: MEXICO: Chiapas: Junction of Highways 190-195, 8 May 1969, H. F. Howden (CNCI); same locality 6 June 1969, H. F. Howden (CNCI); same locality, 24 June 1973, G. Ekis (DSC, USNM); same locality, 32 mi W San Cristobal, 12 May 1969, H. J. Teskey (CNCI); 19 mi SE Tuxtla Gutierrez, 23 July 1963, J. Doyen (CISC). GUATEMALA: Quezaltenango, 7800', Champion, Lectotype and Syntype of *acuminatus* (BMNH); Antigua, 2000 meters, 20 June 1973, G. Ekis (DSC).

Distribution: Chiapas and Guatemala. Present from May through July.

Discussion: It is distinct in the group by the presence of lateral pits on the horn, the raised setae on the pronotum and the medial tubercle of the male protibiae.

Monodon-group

The *monodon*-group is defined as those *Notoxus* with the following characters: mandibular explanation wide, with hind margin prominent; pronotum with distinct raised setae, pubescent antebasal band widely broken; horn with lateral pits; crest without median ridge, margin smooth or crenulate; elytra unicolorous or with postmedian band, some setae raised. Males lacking modifications of elytra and legs; fifth sternite broadly rounded or truncate, without impressions, parameres simple, penis often split laterally at apex.

The Central American species are *desertus* Casey, *cumanensis* LaFerté, *celatus* n. sp., *jamaicus* Pic, *bipunctatus* Chevrolat, *murinipennis* (LeConte), *ruficollis* Champion and *peruvianus* Pic. The United States species included are *monodon* Fabricius, *planicornis* LaFerté and *filicornis* Casey.

This group is the most difficult to identify using color patterns. Examination of the genitalia and the collecting locality are the two tools used here for species identification, particularly for the maculate species near *N. monodon*. The genitalic differences are subtle, but consistent in the populations examined. Also most of these species are allopatric and restricted to islands or to separate areas on the mainland. It is possible that these species are in reality subspecies or "incipient species." The numerical analysis recognized these very similar species as being distinct, which can be justified here on the basis of the genitalic differences. There are names available for all of these species. Further collecting may reveal areas of sympatry, which would lend credence to the assumption that they are distinct species.

Notoxus cumanensis LaFerté (Figs. 25, 57)

Notoxus cumanensis LaFerté 1848: 38-9. Type locality: Cumaná, VENEZUELA. Type series in MNHN.

Notoxus monodon var. *cumanensis*, Champion 1890: 212. Pic 1911: 10.

Werner 1965b: 22.

Notoxus monodon, auctorum.

Length 2.83-3.83. Head and pronotum tan, elytra tan with brown markings: circular mark on omoplates, postmedian irregular band protruding anteriorly along elytral suture, anterior flanks of elytra may be darkened. Pubescence brownish when arising from markings, whitish over rest of body. Raised setae long and erect on pronotum and elytra, average angle on elytra 70°. Mandibular explanation wide, with front and hind margins meeting at same level at mandible. Pronotum with antebasal pubescent band widely broken. Horn with pits beneath, 5-9 teeth on margin. Crest elevated and distinct, rounded at apex. First and second protarsomeres with strong spur on posterior or apical margin.

Males with fifth sternite broadly rounded. Penis split laterally at apex.

Females with fifth sternite rounded-triangular.

Redescribed ♂: Rio Hato, PANAMA (DSC). Length 3.14. Head 0.64 long, eye 0.28 long, raised setae over eyes average 0.19 long; antennomere ratios: I 2.47, II 1.73, III 2.08, IV 1.92, V 1.87, VIII 1.73, X 1.29, XI 2.22; fourth maxillary palpus 0.19 long, 0.09 wide; mandibular explanation 0.10 long, 0.06 wide. Pronotum 1.07 long, length from base to point of greatest width 0.36, break in antebasal pubescent band 0.22 wide; horn 0.42 long, 0.28 wide at base, 6 teeth on margin; crest 0.24 long, 0.11 wide at base; crest apex 0.08 above horn margin, horn apex 0.24 from crest apex; pronotal pit 0.16 long. Raised elytral setae 0.20 long, average angle 71°.

Specimens examined, 39: MEXICO: Tamaulipas: Victoria; 3 mi N Cd. Victoria, 800'; 47 km S Cd. Victoria, 900'; 8.5 mi S Soto la Marina; Santa Engracia; Gomez Farias. San Luis Potosi: Cuesta de los Cedros, 36 km E Cd. del Maiz, 2250'; El Salto de Agua, 100'; 8.7 mi S Santa Mario del Rio. Veracruz: El Palmar, 16 km W Tetzonapa, 600'; Jalapa; Orizaba; Cotaxtla Experiment Station, Cotaxtla. Tabasco: 59.4 mi SE Villahermosa, 100'. Oaxaca: Salina Cruz. BELIZE: Rio Hondo, Bluncaneau. HONDURAS: La Ceiba. PANAMA: Old Panama; Rio Hato: Canal Zone, Ancon. Collected in quarantine on orchids from COLOMBIA. Specimens in collections of: AMNH, CASC, CISC, CNCI, DSC, FGW, FMNH, MCZC, TAMU, TTCC, USNM.

Distribution: The moister areas of the east slope of the Sierra Madre Oriental in Mexico, south through Central America to Venezuela. Apparently present throughout the year. Attracted to light, ultra-violet light, arc light and cantharidin.

Discussion: Very similar in appearance to the other banded species in the group. The genitalia are similar to *monodon* and *jamaicus* by the laterally split apex of the penis. *N. jamaicus* is an island species with the parameres as long as the penis. *N. cumanensis* has the penis distinctly longer than the parameres and only a small dorsal hump near the penis apex. *N. monodon* has the parameres protruding beyond the penis and has a small dorsal tubercle near the penis apex.

Notoxus celatus, n. sp.

(Figs. 24, 57)

Length 2.70-3.68. Head and pronotum tan, elytra tan with brown markings: circular mark on omoplates, irregular postmedian band protruding

anteriorly along elytral suture, mark on flanks of elytra behind humeri. Pubescence brownish when originating in markings, yellowish over rest of body. Raised setae long and erect on pronotum and elytra, average angle on elytra 64°. Mandibular explanation wide, with front and hind margins meeting on same level at mandible. Pronotum with antebasal pubescent band widely broken. Horn with pits beneath, 3-8 teeth on margin. Crest elevated and distinct, rounded at apex. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite broadly rounded. Penis split dorso-ventrally at apex, with strong dorsal tooth near apex.

Females with fifth sternite rounded-triangular.

♂ holotype: 2 mi N Jojutla, Morelos, MEXICO. Length 2.99. Head 0.64 long, eye 0.25 long, raised setae over eyes average 0.18 long; antennomere ratios: I 2.47, II 1.64, III 2.27, IV 2.09, V 1.92, VIII 1.87, X 1.67, XI 2.17; fourth maxillary palpus 0.20 long, 0.10 wide; mandibular explanation 0.09 long, 0.06 wide. Pronotum 0.96 long, length from base to point of greatest width 0.30, break in antebasal pubescent band 0.20 wide; horn 0.38 long, 0.26 wide at base, 6 teeth on margin; crest 0.18 long, 0.10 wide at base; crest apex 0.08 above horn margin, horn apex 0.22 from crest apex; pronotal pit 0.14 long. Raised elytral setae 0.17 long, average angle 62°.

Specimens examined, 241: HOLOTYPE ♂, 2 mi N Jojutla, Morelos, MEXICO, 20 July 1974, R. L. Mangan & D. S. Chandler, cantharidin trap (USNM). PARATYPES: Chihuahua: Catarinas, 5800'. Jalisco: 3 mi SE Plan de Barrancas. Michoacan: 12 mi S Tzitzio on Huetamo Road, 1050 meters; Tuxpan, 6720'. Guerrero: 8 mi SE Iguala; Iguala. Mexico: 2 mi NE Ixtapan de la Sal; Real de Arriba, Temescaltepec, 6-7000'; Tejupilco, ca. 400'; Temescaltepec, ca. 5000'. Morelos: Xochitepec; Cuernavaca; 3 mi N Alpuyeca, 3400'; 5 mi N Axochiapan; 2 mi N Jojutla; 4.4 mi E Cuernavaca; 10 mi E Cuernavaca; 7 mi E Cuernavaca. Puebla: Atlixco; Puebla; 4 mi NW Tehuitzingo, 3500'; 13.3 mi NE Tehuitzingo; 1.1 mi W Acatlan; 11 mi SE Acatlan; 7 mi SW Izucar de Matamoros; 12 mi SW Izucar de Matamoros; 11.8 mi W Izucar de Matamoros; 5 mi SW Chipilo; Tehuacan, ca. 5200'; 6 mi SW Tehuacan; 4 mi S Petalcingo, 5150'. Oaxaca: Huajuapan de Leon; 10 mi NE Huajuapan de Leon. One specimen, state unknown, Rio Blanco. Paratypes in collections of: AMNH, BMNH, CASC, CISC, CNCI, CUIC, DSC, FGW, FMNH, MCZC, MSUC, TAMU, TTCC, UCDC, UMMZ, USNM.

Distribution: The higher elevations of central Mexico, extending north to Chihuahua. It has been collected from April to August by beating vegetation, mesquite, acacia and looking under recently uprooted weeds. Attracted to light, ultra-violet light, cantharidin and drying meloid beetles.

Discussion: It is similar in external appearance to the other banded species in the group. It is separated from these species by having the penis split laterally and dorsoventrally at the apex. There is a dorsal, anteriorly directed process near the apex of the penis which is also not found in the other species.

Notoxus desertus Casey

(Figs. 23, 57)

Notoxus desertus Casey 1895: 767-8. Type locality: Tucson, Arizona. USNM Type #36536. Leng 1920: 163.

Notoxus constrictus Casey 1895: 768. Type locality: coast regions of California. USNM Type #36527. Leng 1920: 163. Fall 1902: 33, 182.

Length 2.83-4.18. Head and pronotum tan, elytra tan with brown markings: circular mark on omoplates, irregular postmedian band protruding anteriorly along elytral suture, form of band variable, may reach anteriorly almost to omoplates or may have straight or irregular margins, mark may be present along anterior flanks. Pubescence brownish when arising from markings, yellowish over rest of body. Raised setae long and erect on pronotum and elytra, average angle on elytra 72°. Mandibular explanation wide, with front and hind margins on same level at mandible. Pronotum with antebasal pubescent band widely broken. Horn with pits beneath, 4-9 teeth on margin. Crest elevated and distinct, usually faintly crenulate, rounded at apex. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite broadly rounded.

Females with fifth sternite rounded-triangular.

Redescribed ♂: Rio Vista, California (DSC). Length 3.22. Head 0.66 long, eye 0.23 long, raised setae over eyes average 0.21 long, antennomere ratios: I 2.35, II 1.91, III 2.27, IV 2.27, V 2.00, VIII 1.67, X 1.24, XI 2.35; fourth maxillary palpus 0.20 long, 0.10 wide; mandibular explanation 0.10 long, 0.06 wide. Pronotum 1.02 long, length from base to point of greatest width 0.30, break in antebasal pubescent band 0.24 wide; horn 0.41 long, 0.30 wide at base, 8 teeth on margin; crest 0.26 long, 0.12 wide at base; crest apex 0.11 above horn margin, horn apex 0.19 from crest apex; pronotal pit 0.18 long. Raised setae 0.21 long, average angle 66°.

Specimens examined, 344: MEXICO: Baja California: Misión; Hamilton Ranch; Ensenada. Baja California Sur: Mulegé; 15 mi N San Ignacio; La Paz; 12 mi NW La Paz; 3.5 mi NE San Pedro; 2 mi SE Todos Santos. Sonora: Alamos; 13 mi SE Alamos; Navajoa; 10 mi E Navajoa; 16 mi NE Cd. Obregon; Saric; Sinaloa: San Javier; Mazatlan; 5 mi N Mazatlan; Los Mochis; 13 mi N Los Mochis; Choix; 5.5 mi NW Choix; 35 mi S Escuinapa; 21 mi E Villa Union; Venedio; 26 mi N Pericos; Los Mayos; 20 mi E Guasave; 5 mi E Concordia; 1 mi W San Blas; Culiacan. Nayarit: San Blas; Rio de las Canyas, 8 mi NW Acaponeta; Tepic; Arroyo Santiago, nr. Jesus Maria; Arroyo Canaveral, nr. Jesus Maria; La Mesa de Nayarit. Chihuahua: Delicias; 10 mi S Delicias. Durango: 2 mi NW Nombre de Dios. Zacatecas: 4 mi E Zacatecas; 15 mi NE Fresnillo; 28 mi S Jalpa. Coahuila: 10 mi S Allende; Boquillas del Carmen; 12 mi N Hermanas. Nuevo Leon: Monterrey; 5 mi S Monterrey; Apodaca; 6 km S Galeana; Linares, Rio Camacho; Mamulique Pass. Tamaulipas: Tampico; 39.5 mi S Jaumave. Hidalgo: Zimapán; 1 mi SE Yolotepec. Queretaro: 12 mi N Vizarrón; Tequisquiapan. Guanajuato: 3 mi N Irapuato. Aguascalientes: Aguascalientes. Jalisco: Lagos de Moreno; Oblatos Canyon, Guadalajara; Chapala; Tecalitlan; Catalitlan. Oaxaca: Oaxaca; 15 mi NW Oaxaca; Mitla; 11.3 mi SE Totolapan; Yagul ruins. Veracruz: Veracruz; Sontecomapan; Jicacal, 7 mi N Sontecomapan; 2 mi NE Catemaco; 2 mi SE Nautla. Tabasco: Frontera. GUATEMALA: Atitlan-see. Specimens in collections of: AMNH, CASC, CDAE, CISC, CNCI, DSC, FGW, FMNH, LACM, MCZC, MSUC, OSUC, TAMU, UCDC, USNM.

Distribution: Found through all of the United States except Southeast, extending south through most of Mexico to Guatemala. Present year-round. This species does not appear to occur in the moister areas of the Sierra Madre Oriental and the region centered by Mexico City. It has been collected sweeping, under low vegetation in corn fields, beating, on *Hoffmannseggia*, on

Helenium nudifloris, on *Medicago*, on roses and on shelled corn. It is attracted to light, ultra-violet light, drying meloid beetles and cantharidin.

Discussion: It is similar to all of the banded species in the group due to the variation in the elytral color pattern. The penis is not split laterally at the apex and is most similar to *bipunctatus*. It is separated from that species by being present on the mainland and lacking the more extensive dark areas on the elytra.

Notoxus bipunctatus Chevrolat
(Figs. 26, 57)

Notoxus bipunctatus Chevrolat 1877: ix. Type locality: Puerto Rico. Type in MNHN. Pic 1894: 46; 1911: 6.

Notoxus Krugi (sic) Quedenfeldt 1886: 121-2. Type locality: Puerto Rico. Pic 1894: 47; 1911: 47.

Length 2.80-3.38. Head and pronotum yellow-brown, elytra yellow-brown with brown markings: usually with oval mark on omoplates, very irregular postmedian band, usually anterior flanks of elytra darkened. Pubescence brownish when arising from marks, yellowish over rest of body. Raised setae long and erect on pronotum and elytra, average angle on elytra 44°. Mandibular explanation moderately wide, with front and hind margins meeting on same level at mandible. Pronotum with antebasal pubescent band widely broken. Horn with pits beneath, 4-6 teeth on margin. Crest distinct and elevated, pointed or rounded at apex. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite broadly rounded. Penis slightly split laterally at apex.

Females with fifth sternite rounded-triangular.

Redescribed ♂: Ponce, PUERTO RICO (DSC). Length 3.22. Head 0.62 long, eye 0.28 long, raised setae over eyes average 0.16 long; antennomere ratios: I 2.00, II 1.36, III 2.00, IV 1.99, V 1.99, VIII 1.71, X 1.53, XI 2.60; fourth maxillary palpus 0.18 long, 0.10 wide; mandibular explanation 0.08 long, 0.06 wide. Pronotum 0.92 long, length from base to point of greatest width 0.29, break in antebasal pubescent band 0.30 wide; horn 0.37 long, width at base 0.28, 4 teeth on margin; crest 0.22 long, 0.12 wide at base; crest apex 0.07 above horn margin, horn apex 0.16 from crest apex; pronotal pit 0.12 long. Raised elytral setae 0.13 long, average angle 40°.

Specimens examined, 18: PUERTO RICO: Ponce, 1/15 June 1945, J. M. Capriles, light trap (USNM); same locality, 21 September 1933, R. G. Oakley, *Scirpus validus* (DSC, USNM); same data except, San Juan, 31 August 1933 (USNM); Coamo Springs, 2 April 1931, S. T. Danforth (MCZC); same locality, 11 February (AMNH); Rio Piedras, July 1931, Alsina (MCZC); Anasco district, 3 July 1917, H. Morrison (USNM).

Distribution: The island of Puerto Rico. Collected on *Scirpus validus* and attracted to light. Present year-round.

Discussion: It is most similar to *desertus* in having the penis without a deep lateral split, although it does have a notch at the apex. Separated from the other species by its occurrence on the island of Puerto Rico.

Notoxus jamaicus Pic

(Figs. 27, 57)

Notoxus jamaicus Pic 1913: 8-9. Type locality: Jamaica. Type in MNHN.
Notoxus quinquemaculatus Pic 1918: 117. Type locality: Jamaica. Type in MNHN. NEW SYNONYMY.

Length 2.70-3.50. Head and pronotum yellow-brown to dark red-brown, pronotum dark brown in lower half, elytra yellow-brown with dark red-brown markings: oval mark on omoplates, rectangular mark along sides of elytral suture at middle, lateral oval marks at end of this mark, these marks often connected together and with mark on omoplates, mark on flanks of elytra curving inward to elytral suture near apex. Pubescence brownish when arising from dark portions of body, yellowish over rest of body. Raised setae long and erect on pronotum and elytra, average angle on elytra 53°. Mandibular explanation wide, with front and hind margins on same level at mandible. Pronotum with antebasal pubescent band widely broken. Horn with pits beneath, 3-7 teeth on margin. Crest distinct and elevated, usually rounded at apex. First and second protarsomeres with strong spur on posterior apical margin.

Male fifth sternite broadly rounded. Penis split laterally at apex.

Females with fifth sternite rounded-triangular.

Redescribed ♂: Alligator Pond, JAMAICA (DSC). Length 2.95. Head 0.66 long, eye 0.28 long, raised setae over eyes average 0.15 long; antenno-mere ratios: I 2.18, II 1.73, III 2.00, IV 2.00, V 2.00, VIII 1.89, X 1.44, XI 2.24; fourth maxillary palpus 0.18 long, 0.12 wide; mandibular explanation 0.09 long, 0.06 wide. Pronotum 0.93 long, length from base to point of greatest width 0.28, break in antebasal pubescent band 0.28 wide; horn 0.38 long, 0.32 wide at base, 4 teeth on margin; crest length 0.22, width at base 0.12; crest apex 0.08 above horn margin, horn apex 0.17 from crest apex; pronotal pit 0.16 long. Raised elytral setae 0.15 long, average angle 49°.

Specimens examined, 23: JAMAICA: Alligator Pond, 20 February, Chaplin & Blackwelder (DSC, USNM); Alligator Pond Bay, 25 February 1937, Station 410, Chaplin & Blackwelder (USNM); Santa Cruz, 24 February 1937, Station 421, Chaplin & Blackwelder (USNM); Morant Bay, 6 February 1937, Station 391, Chaplin & Blackwelder (DSC, USNM); Spanish Town, 2 February 1936, Station 377, Chaplin & Blackwelder, flying at dusk (USNM); Milk River, 25 February 1937, Station 415, Chaplin & Blackwelder (USNM); Trelawney, Duncans, 4 August 1966, Howden & Becker (CNCI); same locality, 7 August 1966, A. T. Howden, at light (HAHC); St. Andrew Parish, Bull Run, 19 April 1959, Farr & Sanderson, on *Agave americana* (FGW).

Distribution: The island of Jamaica. Collected on *Agave* and attracted to light. Probably present year-round.

Discussion: It is most similar to *cumanensis* and *monodon* by the penis being laterally split at the apex. The parameres are as long as the penis which places it as an intermediate between the other two species. There is no trace of a dorsal hump near the penis apex.

Notoxus murinipennis (LeConte)

(Figs. 28, 57)

Anthicus bicolor Say 1817: plate IV (not bicolor Oliver). Type locality: New Jersey and Pennsylvania. Say 1824: 21; 1827: 38.

Anthicus murinipennis LeConte 1824: 170. Type locality: Georgia. MCZ Type #4889.

Monocerus bicolor, LeConte 1847: 90.

Notoxus bicolor LaFerté 1848: 53. LeConte 1852: 94. Horn 1884: 167.

Champion 1890: 205. Casey 1895: 756. Pic 1911: 6. Leng 1920: 162.

Notoxus murinipennis, Barber 1941: 26.

Length 2.91-3.90. Head and elytra varying from tan to blue-brown, pronotum varying from tan to orange. Pubescence whitish over all of body. Raised setae distinct on pronotum, of moderate length on elytra, average angle 35°. Mandibular explanation wide, with front and hind margins meeting on same level at mandible. Pronotum with antebasal pubescent band widely broken. Horn with pits beneath, 6-10 teeth on margin. Crest margin crenulate, front rarely indistinct and merging with horn, front pointed. First and second protarsomeres with strong spur on posterior apical margin.

Male with fifth sternite broadly rounded at apex. Penis slightly split laterally at apex.

Females with fifth sternite rounded-triangular.

Redescribed ♂: 2 mi E Roper, North Carolina (DSC). Length 3.34. Head 0.67 long, eye 0.28 long, raised setae over eyes average 0.14 long; antennomere ratios: I 2.92, II 2.00, III 2.45, IV 1.61, V 1.78, VIII 1.86, X 1.37, XI 2.33; fourth maxillary palpus 0.18 long, 0.10 wide; mandibular explanation 0.08 long, 0.05 wide. Pronotum 1.10 long, length from base to point of greatest width 0.38, break in antebasal pubescent band 0.26 wide; horn 0.46 long, 0.32 wide at base, 10 teeth on margin; crest 0.32 long, 0.15 wide at base; crest apex 0.05 above horn margin, horn apex 0.15 from crest apex; pronotal pit 0.18 long. Raised elytral setae 0.11 long, average angle 30°.

Specimens examined, 19: MEXICO: San Luis Potosi: Tamazunchale, Rt. 1, km 365, 31 May 1948, F. Werner & W. Nutting, river in tropical area, light trap (FGW); same locality, 1 May 1955, Buliofer & Guelo (USNM).

Veracruz: Cordoba, 19 April 1908, A. Fenyes (USNM); same data except, April 30, 1908 (USNM); same locality (CASC); Fortin de las Flores, 24 December 1963, L. B. & C. W. O'Brien (CASC); same locality, 28 June 1975, D. S. Chandler, meloid trap, ultraviolet light (DSC). Oaxaca: 11 mi N Matias Romero, 6 June 1971, Clark, Murray, Hart, Schaffner (TAMU).

GUATEMALA: Gualan, 13 February 1906, J. S. Hine (OSUC). Collected in quarantine at Brownsville, Texas, with avocados and on bag of green pepper (USNM).

Distribution: From the southeastern portion of the United States through the moist eastern slope of the Sierra Madre Oriental to Guatemala. Apparently present throughout the year. Collected by beating vegetation and attracted to harvested crops, ultra-violet light and drying meloid beetles.

Discussion: It is most similar to *ruficollis* by the short raised elytral setae and the unicolorous elytra. It can be separated by the unicolorous pronotum and the parameres paralleling the penis.

Notoxus ruficollis Champion

(Figs. 29, 57)

Notoxus ruficollis Champion 1890: 205, Table XI, fig. 13. Type locality: San Lorenzo, Chiriqui, PANAMA. Type series in BMNH. Pic 1894: 47; 1911: 11.

Notoxus atripennis Champion 1890: 205. Type locality: Chacoj, Polochic Valley, GUATEMALA. Type in BMNH, ♀. Pic 1894: 46; 1911: 6. NEW SYNONYMY.

Length 2.41-2.46. Head, horn on pronotum and elytra blue-orange, rest of pronotum dusky-orange. Pubescence whitish over all of body. Raised setae distinct on pronotum, of moderate length on elytra, average angle 35°. Mandibular explanation wide, with front and hind margins meeting at same level at mandible. Pronotum with antebasal pubescent band widely broken. Horn with pits beneath, 9-11 teeth on margin. Crest margin crenulate, front indistinctly merging with horn. First and second protarsomeres with strong spur on posterior apical margin.

Male with fifth sternite broadly rounded. Apical half of parameres bent laterally.

Female with fifth sternite rounded-triangular.

Redescribed ♂: Trece Aguas, Alta Vera Paz, GUATEMALA (USNM). Length 2.41. Head 0.72 long, eye 0.28 long, raised setae over eyes average 0.14 long; antennomere ratios: I 2.15, II 1.78, III 1.78, IV 1.44, V 1.45, VIII 1.67, X 1.28, XI 2.05; fourth maxillary palpus 0.20 long, 0.11 wide; mandibular explanation 0.12 long, 0.07 wide. Pronotum 1.12 long, length from base to point of greatest width 0.46, break in antebasal pubescent band 0.22 wide; horn 0.38 long, 0.28 wide at base, 11 teeth on margin; crest 0.25 long, 0.13 wide at base; crest apex merging with horn; horn apex 0.10 from crest apex; pronotal pit 0.24 long. Raised elytral setae 0.07 long, average angle 35°.

Specimens examined, 2: GUATEMALA: Cacao, Trece Aguas, Alta Vera Paz, April 1923, Schwarz & Barber (USNM); Chacoj, Vera Paz, Champion, Holotype of *Notoxus atripennis* Champion (BMNH).

Distribution: From Guatemala to Panama.

Discussion: It is most similar to *murinipennis*. It can be separated by the horn being abruptly darker than the pronotum and the laterally spread parameres.

Notoxus peruvianus Pic

(Figs. 30, 58)

Notoxus peruvianus Pic 1904: 228. Type locality: Cuzco, PERU. Type in MNHN. Pic 1914: 183.

Length 2.70-3.74. Head and pronotum tan, elytra tan to blue-orange. Pubescence yellowish. Raised setae long and erect on pronotum and elytra, average angle on elytra 69°. Mandibular explanation wide, with front and hind margins meeting on same level at mandible. Pronotum with antebasal pubescent band widely broken. Horn with pits beneath, 6-11 teeth on margin.

Crest crenulate, anterior margin usually distinct, apex usually pointed. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite broadly rounded at apex.

Females with fifth sternite rounded-triangular.

Redescribed ♂: 16 km N Barranca, PERU (DSC). Length 3.60. Head 0.75 long, eye 0.32 long, raised setae over eyes average 0.20 long; antennomere ratios: I 2.30, II 1.40, III 1.53, IV 1.39, V 1.67, VIII 1.70, X 1.45, XI 2.15; fourth maxillary palpus 0.20 long, 0.11 wide; mandibular explanation 0.12 long, 0.06 wide. Pronotum 1.14 long, length from base to point of greatest width 0.38, break in antebasal pubescent band 0.26 wide; horn 0.48 long, 0.28 wide at base, 6 teeth on margin; crest 0.30 long, 0.11 wide at base; crest apex 0.02 above horn margin, horn apex 0.18 from crest apex; pronotal pit 0.18 long. Raised elytral setae 0.19 long, average angle 72°.

Specimens examined, 39: PERU: 16 km N Barranca, 15 March 1951, Ross & Michelbacher (CASC); Casma, 24 March 1951, Michelbacher & Ross (CASC); 10 km S Chiclayo, 19 March 1951, Ross & Michelbacher (CASC); Amotape, 13 November 1938, D. & H. Frizzell (FGW); Chancay, 25 March 1951, Ross & Michelbacher, river valley (CASC); Lima, J. Wille (USNM); Lima, 13 March 1931, F. Wille (USNM); Yantan, September 1929, Wille (USNM); Canete, May and June 1941, C. P. Clause (USNM); Montevideo, South America Paras Laboratory, 30 December 1941, Berry (USNM). BOLIVIA: Chaco-Chalumani, 25 May, G. L. Harrington (CASC).

Distribution: Peru and Bolivia. Apparently present throughout the year.

Discussion: It is most similar to *murinipennis* and *ruficollis* by the unicolorous elytra. It can be separated by the longer and more erect setae of the elytra.

Nuperus-group

The *nuperus*-group is defined as those *Notoxus* with the following characters: mandibular explanation narrow to wide; pronotal tactile setae short and distinct, usually uncommon, pubescent antebasal band widely broken; horn without lateral pits; crest margin smooth, apex pointed or rounded; elytral setae appressed; males with simple elytra and legs; fifth sternite emarginate, circular impression before apex.

The species included in the group are *nuperus* Horn, *hastrus* n. sp., *posticus* n. sp. and *orientalis* n. sp.

Notoxus nuperus Horn

(Figs. 32, 60)

Notoxus nuperus Horn 1884: 168. Type locality: Arizona. MCZC Type #3043, ♂. Pic 1894: 47; 1911: 10. Casey 1895: 757. Leng 1920: 162. Pallister 1955: 11, in part.

Length 3.30-4.48. Head and pronotum tan to red-brown, elytra tan with brown markings: postmedian band extending anteriorly along elytral suture to omoplates, apical band extending along elytral suture to postmedian band, flanks often dark. Pubescence brownish when arising from marks, whitish over rest of body. Raised setae uncommon but distinct on pronotum, setae on elytra appressed, average angle 9°. Mandibular explanation moderately wide,

often front and hind margins meet mandible at same level. Pronotum with antebasal band widely broken. Horn without pits beneath, 0-2 teeth on margin. Crest margin smooth, apex distinct, pointed or rounded. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite deeply emarginate into deep circular impression. Fourth sternite often slightly flattened medially.

Females with fifth sternite rounded-triangular.

Redescribed ♂: Texas Canyon, Cochise County, Arizona (DSC). Length 3.56. Head 0.67 long, eye 0.26 long, raised setae over eyes average 0.10 long; antennomere ratios: I 2.67, II 1.83, III 2.00, IV 1.78, V 2.00, VIII 1.40, X 1.13, XI 2.24; fourth maxillary palpus 0.20 long, 0.10 wide; mandibular explanation 0.12 long, 0.05 wide. Pronotum 1.09 long, length from base to point of greatest width 0.32, break in antebasal pubescent band 0.28 wide; horn 0.48 long, 0.33 wide at base, no teeth on margin; crest 0.35 long, 0.14 wide at base, apex pointed; crest apex 0.08 above horn margin, horn apex 0.16 from crest apex; pronotal pit 0.12 long. Elytral setae 0.08 long, average angle 8°. Emargination of fifth sternite 0.18 wide, 0.06 deep.

Specimens examined, 78: MEXICO: Chihuahua: 5 mi NE Hidalgo del Parral, 6000'; Catarinas, 5800'; Valle de Olivos, 5500'; Primavera, 5500-6000'; 6 mi S Villa Matamoros; 15 mi E Cuauhtemoc, 6600'; Santa Clara Canyon, 5 mi W Parrita. Durango: Tepehuanes; Durango; 5 mi W Durango; 23 mi S Durango. Jalisco: 5 km W Lagos, 6000'. Specimens in collections of: AMNH, CASC, CISC, CNCI, DSC, FGW, MCZC, TTCC, UCDC, USNM.

Distribution: From southeastern Arizona through the western half of the central plateau of Mexico. Attracted to white and ultra-violet light. Present from June through August.

Discussion: Very similar to *haustrus* by the deep impression of the male fifth sternite and the general external appearance. It is separated by having at the most the fourth sternite slightly flattened, the presence of some erect setae on the pronotum, and the mandibular explanation being moderately wide to wide. Similar to *orientalis* in the appressed setae on the elytra, but easily separated by the deep impression on the male fifth sternite.

Notoxus haustrus, n. sp.

(Figs. 33, 60)

Notoxus nuperus, Pallister 1955: 11, in part.

Length 2.90-4.38. Head and pronotum tan to orange-brown, elytra tan with brown markings: irregular postmedian band extending anteriorly along elytral suture, flanks often dark, apical band extending anteriorly along elytral suture. Pubescence brownish when arising from marks, whitish over rest of body. Setae on pronotum and elytra appressed, on elytra average angle 10°. Mandibular explanation narrow, with hind margin indistinct and meeting mandible at lower level than front margin. Pronotum with antebasal pubescent band widely broken. Horn without pits beneath, 0-2 teeth on margin. Crest margin smooth, apex rounded and distinct. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite deeply emarginate into large circular impression. All sternites usually medially flattened.

Females with fifth sternite rounded-triangular.

♂ holotype: Colossal Cave County Park, Pima County, Arizona. Length

3.59. Head 0.70 long, eye 0.30 long, raised setae above eyes average 0.10 long; antennomere ratios: I 2.35, II 1.54, III 1.92, IV 1.33, V 1.47, VIII 1.14, X 0.83, XI 1.70; fourth maxillary palpus 0.20 long, 0.10 wide; mandibular explanation 0.10 long, 0.05 wide. Pronotum 1.05 long, length from base to point of greatest width 0.35, break in antebasal pubescent band 0.38 wide; horn 0.50 long, 0.33 wide at base, no teeth on margin; crest 0.26 long, 0.16 wide at base; crest apex 0.12 above horn margin, horn apex 0.19 from crest apex; pronotal pit 0.10 long. Elytral setae 0.08 long, average angle 8°. Emargination of fifth sternite 0.24 wide, 0.08 deep.

Specimens examined, 225: HOLOTYPE ♂, Colossal Cave County Park, Pima Co., Arizona, 8 July 1973, K. Stephan, UV light (USNM). PARATYPES: Montana: Broadwater Co.: Toston. Utah: San Juan Co.: Monticello; Poverty Flats. New Mexico: McKinley Co.: Tohatchi; Gallup. Bernalillo Co.: Albuquerque; 7 mi NE Albuquerque. Doña Ana Co.: Las Cruces. Luna Co.: 40 mi S Deming. Arizona: Apache Co.: Ganado. Gila Co.: Cutter; Globe; Claypool. Graham Co.: Bonita. Yavapai Co.: Dewey; Kirkland; Skull Valley. Pinal Co.: 5 mi N Mammoth. Pima Co.: Tucson; Corona de Tucson; I. B. P. site, Santa Rita Range Reserve; Continental; 7 mi SE Continental; 5 mi E Sahuarita; 4 mi NNW Redington; Arizona-Sonora Desert Museum; mouth of Bear Canyon, Santa Catalina Mtns.; Chutum Vaya Canyon, Baboquivari Mtns.; Brown's Canyon, Baboquivari Mtns.; Bog Springs, Madera Canyon. Santa Cruz Co.: Tumacacori; 8 mi N Nogales; Sycamore Canyon, nr. Ruby; Peña Blanca, 10 mi W Nogales; 1 mi S Patagonia; 10 mi S Patagonia; Canelo. Cochise Co.: Pearce; Willcox; Cochise Stronghold, Dragoon Mtns.; Bowie; 5 mi W entrance Chiricahua National Monument. MEXICO: Sonora: Hermosillo; 40 mi N Hermosillo; Saric; Navajoa; 20 mi NE Obregon. Sinaloa: Los Mochis. Chihuahua: Santa Clara Canyon, 5 mi W Parrita; 3 mi S Villa Ahumada; Chihuahua; 5 mi N Cerro Campana; Primavera; Delicias; 25 mi SW Camargo; 5 mi S Galeana. Zacatecas: Laguna Balderama, 25 mi W Fresnillo. Paratypes in collections of: AMNH, CASC, CDAE, CISC, DSC, FGW, MCZC, OSUC, TTCC, USNM.

Distribution: The Great Plains to northwestern Mexico. Collected on cotton, alfalfa, *Salix*, *Baccharis glutinosa*, *Prosopis glandulosa*, *Chilopsis linearis* and *Sapindus saponaria*. Attracted to light, ultra-violet light and drying meloid beetles (Werner 1964 as *N. nuperus*). Present from June to September.

Discussion: It is most similar to *nuperus*. Separated by the narrow mandibular margin, the appressed setae on the pronotum, and by usually having the first four sternites medially flattened in the male, along with the differences in horn structure used in the key to species. *Nuperus* and *hastrus* are the only species of the *nuperus*-group found on the western half of the Mexican central plateau.

Notoxus postictus, n. sp.

(Figs. 34, 60)

Length 2.80-3.39. Head and pronotum orange to brown, elytra tan with brown markings: circular mark on omoplates, postmedian band slightly curved anteriorly to elytral suture, occasionally reaching marks on omoplates, apical band often meeting postmedian band along elytral suture, flanks usually dark. Pubescence brownish when arising from marks, whitish over rest of body. Raised setae distinct on pronotum, setae on elytra decumbent,

average angle of setae at greatest elevation 20°. Mandibular explanation narrow, hind margin meeting mandible on lower level than front margin. Pronotum with antebasal pubescent band widely broken. Horn without pits beneath, 0-4 teeth on margin. Crest margin smooth, apex distinct, usually rounded. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite deeply emarginate into deep, slightly transverse impression.

Females with fifth sternite rounded-triangular.

♂ holotype: Santa Engracia, Tamaulipas, MEXICO. Length 3.48. Head 0.72 long, eye 0.30 long, raised setae above eyes average 0.12 long; antennomere ratios: I 2.17, II 1.67, III 2.31, IV 1.47, V 1.47, VIII 1.20, X 0.87, XI 1.75; fourth maxillary palpus 0.20 long, 0.11 wide; mandibular explanation 0.10 long, 0.04 wide. Pronotum 1.10 long, length from base to point of greatest width 0.37, break in antebasal pubescent band 0.27 wide; horn 0.44 long, 0.31 wide at base, 1 tooth on margin; crest 0.26 long, 0.12 wide at base, apex pointed; crest apex 0.09 above horn margin, horn apex 0.22 from crest apex; pronotal pit 0.13 long. Raised setae 0.10 long, average angle 19°. Emargination of fifth sternite 0.16 wide, 0.04 deep.

Specimens examined, 38: HOLOTYPE ♂, Santa Engracia, Tamaulipas, MEXICO, 23 June 1969, J. M. Mathieu & M. W. Sanderson, black light trap (USNM). PARATYPES: Texas: Brewster Co.: 2♂♂, 1♀, 9 mi W Alpine, 17 August 1969, J. C. Schaffner, at light (TAMU). Crosby Co.: 1♂, 1♀, Post & Crosbyton, 27 June, T. C. Clark & L. J. Muchmore (LACM). Culberson Co.: 1♂, Pine Springs, 18 August 1970, C. W. O'Brien (TTCC). Randall Co.: 1♂, Palo Duro State Park, nr. Amarillo, 27 June 1968, J. E. Slansky (UCDC). Uvalde Co.: 2♂♂, Garner State Park, 22/24 June 1961, R. L. Westcott (LACM). MEXICO: Coahuila: 1♂, 10 mi S Allende, 11 August 1958, H. F. Howden (CNCI). Nuevo Leon: 1♀, Mamulique Pass, 18 June 1975, D. S. Chandler, UV light (DSC); 1♀, Linares, Rio Camacho, 21/22 June 1965, O. S. Flint (USNM); 1♂, 15 mi W Linares, 27 August 1969, J. Doyen & J. Haddock (CISC); 1♀, 20 mi W Linares, 8 November 1946, E. S. Ross (CASC); 2♂♂, 2♀♀, Huasteca Canyon, nr. Monterrey, 11 July 1963, H. F. Howden (CNCI); 1♂, 6 km S Galeana, 25/26 June 1969, M. W. Sanderson & J. M. Mathieu, black light trap (FGW). Tamaulipas: 4♂♂, 1♀, eutopotypical; 4 mi SW Cd. Victoria, 1100'; 3♂♂, 10 July 1963 and 1♂, 5 August 1963, Duckworth & Davis (USNM); 1♂, 29 km S Hidalgo, 11 July 1952, F. & F. Werner (FGW). San Luis Potosi: 1♂, 1♀, Tamazunchale, Rt. 1, km 365, 31 May 1948, F. Werner & W. Nutting, river in tropical area, light trap (FGW); 1♂, same locality, 1 May 1955, Buliofer & Guelo (USNM); 5♀♀, 1 mi SW Tamazunchale, 7 July 1966, P. M. Wagner, at light (TAMU).

Distribution: Western Texas into northern Mexico east of the Sierra Madre Oriental. Attracted to light and ultra-violet light. Present from May to November.

Discussion: It is similar to *hastrus* and *nuperus* in the deep impression of the male fifth sternite. Easily separated from the other species in the group by the slightly raised elytral setae. The only species of this group which are on the east side of the Central Plateau are *postictus* and *orientalis*.

Notoxus orientalis, n. sp.

(Figs. 35, 60)

Length 2.82-3.55. Head brown to dark brown, pronotum orange to red-

brown, elytra tan with brown markings: postbasal band across omoplates often interrupted at elytral suture, irregular postmedian band advanced along elytral suture, rarely meeting postbasal band, apical band extending anteriorly along elytral suture. Pubescence brownish when arising from dark areas, whitish over rest of body. Raised setae distinct on pronotum, setae on elytra appressed, average angle 8°. Mandibular explanation narrow, hind margin meeting mandible at lower level than front margin. Pronotum with antebasal pubescent band widely broken. Crest margin smooth, apex rounded and distinct. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite emarginate, shallow circular impression from apex.

Females with fifth sternite rounded-triangular.

♂ holotype: 6 km S Galeana, Nuevo Leon, MEXICO. Length 3.58. Head 0.65 long, eye 0.24 long, raised setae above eyes 0.08 long; antennomere ratios: I 2.25, II 1.50, III 2.00, IV 1.64, V 1.59, VIII 0.96, X 0.86, XI 1.54; fourth maxillary palpus 0.20 long, 0.10 wide; mandibular explanation 0.11 long, 0.04 wide. Pronotum 1.14 long, length from base to point of greatest width 0.38, break in antebasal pubescent band 0.26 wide; horn 0.44 long, 0.32 wide at base, no teeth on margin; crest 0.28 long, 0.14 wide at base; crest apex 0.12 above horn margin, horn apex 0.22 from crest apex; pronotal pit 0.10 long. Elytral setae 0.08 long, average angle 7°. Emargination of fifth sternite 0.16 wide, 0.01 deep.

Specimens examined, 69: HOLOTYPE ♂, 6 km S Galeana, Tamaulipas, MEXICO, 25/26 June 1969, M. W. Sanderson & J. M. Mathieu, black light trap (USNM). PARATYPES: MEXICO: Coahuila: 1♀, 21 mi SE Saltillo, 6000', 18 July 1963, H. F. Howden (CNCI). Nuevo Leon: 5♂♂, 1♀, 3 mi S Galeana, 5400', 29 May 1971, A. Newton, blacklight-thorn scrub (FGW); 8♂♂, eutopotypical; 1♂, 16 mi W Linares on Mex. 60, 2200', 26/29 May 1971, A. Newton, canyon bottom, UV trap (FGW); 2♂♂, 40 mi NW Junction Highway 57 & 60, 22 June 1971, C. W. O'Brien & Marshall (TTCC); 1♂, Cerro Potosi, 10,200' Schaffner (TAMU); 9♀♀, 18 N La Escondida, 4 July 1974, Clark, Murray, Ashe, Schaffner (TAMU); 1♀, 3 mi S Pacheco, 3/4 July 1974, Clark, Murray, Ashe, Schaffner (TAMU). San Luis Potosi: 3♂♂, 3♀♀, km 710, Highway 57 N of San Luis Potosi, 11 July 1969, Ward, Tenorio, Bennett, host: mesquite (TTCC); 1♂, 2♀♀, 19 mi N San Luis Potosi, 1 September 1958, H. F. Howden (CNCI); 3♀♀, 11 mi N Matehuala, 2 September 1958, H. F. Howden (CNCI). Hidalgo: 13♂♂, 1♀, Zimapan, 11/14 June 1951, P. D. Hurd, H. E. Evans, at light (CASC); 1♂, 2 mi SE Zimapan, 24 June 1975, D. S. Chandler, beating vegetation (DSC).

Distribution: The drier areas around the Sierra Madre Oriental. Collected on mesquite and by beating vegetation. Attracted to light and ultra-violet light. Present from May through September.

Discussion: Similar to *nuperus* and *hastrus* in the appressed elytral setae. It is very distinct in the shallow impression of the male fifth sternite and the very irregular postmedian band.

Apicalis-group

The *apicalis*-group is defined as those *Notoxus* with the following characters: mandibular explanation narrow, hind margin meeting mandible at a lower level than the front margin; pronotal tactile setae distinct, pubescent

antebasal band widely broken; crest margin smooth, apex rounded and distinct; elytra with postmedian band, raised setae present; males without modifications of the elytra and legs; fifth sternite emarginate; penis and parameres simple.

The Central American species included are *apicalis* LeConte, *marginatus* LeConte and *mexicanus* Champion. One United States species, *pallidus* Fall, is also included. This species is found along the lower Colorado River and probably also occurs in Mexico along the river. It is included in the key to species.

Notoxus apicalis LeConte

(Figs. 47, 63)

Notoxus apicalis LeConte 1852: 93. Type locality: Detroit, Michigan (probably incorrect). MCZC type #4892, ♀. Horn 1884: 170. Casey 1895: 758.

Pic 1911: 5. Leng 1920: 163. Not Pallister 1955: 9, misidentification.

Notoxus nuperoides Fall 1916: 33-4. Type locality: Silver City, New Mexico.

MCZC type #24331, ♂. Leng 1920: 162.

Length 3.37-4.40. Head and pronotum tan to brown, pronotum often with lateral areas darker, elytra tan with brown markings: circular mark on omo-plates, postmedian band often advancing anteriorly along elytral suture to omo-plates, flanks rarely dark, apical band often narrowly extended along elytral suture to postmedian band. Pubescence brownish when arising from dark areas, yellowish over rest of body. Raised setae distinct on pronotum, long and erect on elytra, average angle 50°. Mandibular explanation narrow, anterior margin meeting mandible at higher level than posterior margin. Pronotum with antebasal pubescent band widely broken. Horn without pits beneath, 1-4 teeth on margin. Crest margin smooth, rounded anteriorly. First and second protarsomeres with strong spur on posterior apical margin.

Male with fifth sternite slightly emarginate, transverse depression anterior to apical margin.

Females with fifth sternite rounded-triangular.

Redescribed ♂: 18 mi E El Puerto, Sonora, MEXICO (DSC). Length 4.02. Head 0.79 long, eye 0.32 long, raised setae over eyes average 0.20 long; antennomere ratios: I 2.39, II 1.85, III 2.14, IV 2.00, V 1.76, VIII 1.50, X 1.20, XI 2.24; fourth maxillary palpus 0.22 long, 0.11 wide; mandibular explanation 0.14 long, 0.05 wide. Pronotum 1.34 long, length from base to point of greatest width 0.40, break in antebasal pubescent band 0.36 wide; horn 0.60 long, 0.40 wide at base, 3 teeth on margin; crest 0.41 long, 0.12 wide at base; crest apex 0.08 above horn margin, horn apex 0.24 from crest apex; pronotal pit 0.12 long. Raised elytral setae 0.20 long, average angle 55°.

Specimens examined, 83: MEXICO Sonora: 18 mi E El Puerto, 7 August 1960, P. H. Arnaud, Jr., E. S. Ross, D. C. Rentz (CASC). Chihuahua: 20 mi SW Camargo, 13 July 1947, Gertsch (AMNH); 25 mi SW Camargo, 14 July 1947, Cazier, Gertsch (AMNH); Santa Barbara Dist., Santa Barbara, 7500', 18 July 1947, Gertsch (AMNH). Durango: 6 mi S Durango, 4 July 1964, H. F. Howden (CNCI); Rio Florida, nr. Las Nieves, 5200', 3 August 1966, G. E. Ball & D. R. Whitehead, blacklight (FGW).

Distribution: The Great Plains and Great Basin south into Sonora and the Mexican central plateau. It has been collected on alfalfa and cotton and is attracted to white light and ultra-violet light. Present from July through August.

Discussion: This species is most similar to *mexicanus* and *pallidus*. It is separated from *mexicanus* by the horn having less than four teeth on the margin, and can be separated from *pallidus* by the absence of ventro-lateral pits on the horn.

Notoxus marginatus LeConte

(Figs. 48, 63)

Notoxus marginatus LeConte 1852: 93. Type locality: Detroit, Michigan (probably incorrect). MCZC type 34893.

Notoxus apicalis var. *marginatus*, Pic 1911: 6. Leng 1920: 163.

Notoxus apicalis, auctorum.

Length 3.20-4.79. Head and pronotum tan, elytra tan with brown markings: circular mark on omoplates, postmedian band advanced somewhat along elytral suture, mark on posterior flanks of elytra extending to apex and anteriorly along elytral suture. Pubescence brownish when arising from marks, yellowish over rest of body. Raised setae distinct on pronotum, long and erect on elytra, average angle on elytra 35°. Mandibular explanation narrow, hind margin joining mandible at lower lower level than front. Pronotum with antebasal pubescent band widely broken. Horn without pits beneath, 1-3 teeth on margin. Crest elevated, apex rounded and distinct. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite slightly emarginate at apex, with shallow transverse impression before apex.

Females with fifth sternite rounded-triangular.

Redescribed ♂: 3 mi N Las Cruces, Doña Ana Co., New Mexico (DSC). Length 4.50. Head 0.80 long, eye 0.32 long, raised setae over eyes average 0.13 long; antennomere ratios: I 2.37, II 1.53, III 1.93, IV 1.69, V 1.84, VIII 1.60, X 1.32, XI 2.48; fourth maxillary palpus 0.22 long, 0.12 wide; mandibular explanation 0.12 long, 0.04 wide. Pronotum 1.42 long, length from base to point of greatest width 0.44, break in antebasal pubescent band 0.32 wide; horn 0.64 long, 0.36 wide at base, 1 tooth on margin; crest 0.38 long, 0.11 wide at base; crest apex 0.12 over horn margin, horn apex 0.36 from crest apex; pronotal pit 0.12 long. Raised setae 0.14 long, average angle 30°. Emargination of fifth sternite 0.17 wide, 0.01 deep.

Specimens examined, 126: MEXICO: Chihuahua: Samalayuca, 24 June 1947, Gertsch, Cazier, Michener (AMNH); same locality, 6 August 1950, R. F. Smith (AMNH); 25 mi SW Camargo, 14 July 1947, Gertsch, Cazier, Michener (AMNH); Delicias, 4150', 11 July 1947, Schramel, Michener (AMNH). Coahuila: Saltillo, 9 July 1952, F. & F. Werner (FGW); Laguna Coahuila, 26 June 1905, A. L. Herrera (USNM); San Pedro de Colonias, 3700', 20 August 1947, Michener (AMNH); Torreon, 18 July 1918, MacKinney & Loftin (USNM); Boquillas del Carmen, 1850', 23 May 1959, Howden & Becker, at light (CNCI). Durango: Lerdo, 31 June 1918, MacKinney & Loftin (USNM); same data except, 16 July 1918 (USNM); Gomez Palacio, 14 July 1975, D. S. Chandler, meloid trap (DSC). Collected in quarantine at Laredo-on grocery bag, on dry shelled beans, on corn, on chick peas, in shelled corn, in dry corn, on string beans, on dry shelled beans, on Tamarinds, on zinnias, on dry garlic, on apple stem, on garlic; in quarantine at El Paso-on green beans, with Avocado, on vegetable bin, on husk tomatoes, on green corn ears, in seed, on Verbena plants, with carrots, with sugar cane leaves, on mango seeds; in

quarantine at Eagle Pass-on roots.

Distribution: From the Great Basin south to the northern portion of the Central Plateau of Mexico. Collected on a variety of harvested crops, also on *Tamarix* and sorghum in the United States. Attracted to white light, ultra-violet light and drying meloid beetles. Present from May through August.

Discussion: It is distinct from the other species in the group by having the raised elytral setae shorter than half the eye length, and the setae at a lower angle of about 35° . Similar to *apicalis* in the transverse impression on the male fifth sternite and the elytral color pattern.

Notoxus mexicanus Champion

(Figs. 49, 63)

Notoxus mexicanus Champion 1890: 213, Table IX, fig. 22. Type series

localities: Mazatlan, Sinaloa; Acapulco and Iguala, Guerrero;

Guanajuato, Guanajuato, MEXICO. Type series in BMNH and FGW.

Pic 1894: 47; 1911: 9.

Length 3.45-6.18. Head and pronotum tan to red-brown, elytra tan with brown markings: oval mark on omoplates usually joined together and to postmedian band along elytral suture, flanks of elytra dark, apical band advancing anteriorly along elytral suture, often reaching postmedian band. Pubescence brownish when arising from marks, whitish over rest of elytra. Raised setae long and erect on pronotum and elytra, average angle on elytra 60° . Mandibular explanation narrow, posterior margin meeting mandible at lower level than anterior margin. Pronotum with antebasal band widely broken. Horn without pits beneath, 4-8 teeth on margin. Crest margin smooth, anterior margin distinct, usually rounded. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite truncate, shallow transverse impression before apex.

Females with fifth sternite rounded-triangular.

Redescribed ♂: Arroyo Cuyuchaba, 11.5 mi E Alamos, Sonora, MEXICO (DSC). Length 3.91. Head 0.89 long, eye 0.32 long, raised setae over eyes average 0.21 long; antennomere ratios: I 2.74, II 1.67, III 3.18, IV 2.07, V 1.79, VIII 1.62, X 1.37, XI 2.46; fourth maxillary palpus 0.25 long, 0.14 wide; mandibular explanation 0.15 long, 0.05 wide. Pronotum 1.40 long, length from base to point of greatest width 0.39, break in antebasal pubescent band 0.38; horn 0.60 long, 0.34 wide at base, 6 teeth on margin; crest 0.36 long, 0.24 wide at base, rounded at apex; crest apex 0.06 above horn margin, horn apex 0.17 from crest apex; pronotal pit 0.16 long. Raised elytral setae 0.18 long, average angle 73° .

Specimens examined, 144: MEXICO: Sonora: 5 mi E Alamos; 13 mi SE Alamos; Arroyo Cuyuchaba, 11.5 mi E Alamos. Sinaloa: Choix; 5.5 mi NW Choix; 8 mi S Elota; 21 mi E Villa Union; Los Mayos; Rosario. Nayarit: San Blas; 3 mi SE San Blas; Jesus Maria; Arroyo Santiago, nr. Jesus Maria; Tepic. Zacatecas: 28 mi S Jalpa. Jalisco: 8 mi N Guadalajara. Guerrero: 2 mi S Mexcala; Iguala, Höge, type of *N. mexicanus* (FGW). Morelos: 5 mi N Axochiapan; Tejalpa. Puebla: 7 mi NE Atlixco; 34 mi S Atlixco; 45 mi N Acatlan; Tepexco, Rte. 115, 4000'; Puente Estudo, nr. Tepexco, Rte. 115, 4000'; 5 mi SW Chipilo; 6 mi NE Zacatepec. Oaxaca: Huajuapan de Leon; 10 mi NE Huajuapan de Leon; 25 mi NE Oaxaca; Yagul ruins. All collections con-

taining specimens.

Distribution: Throughout Mexico except the northern desert and the southern tropical regions. Present from June to November. Collected under recently uprooted weeds, under low vegetation in a corn field and sweeping low vegetation. Attracted to light, ultra-violet light and drying meloid beetles.

Discussion: It is most similar to *apicalis* in general appearance. Separated by having four or more teeth on the horn margin.

Talpa-group

The *talpa*-group is defined as those *Notoxus* with the following characters: mandibular explanation narrow to moderately wide; pronotum with tactile setae appressed and not apparent, pubescent antebasal band widely broken; horn without lateral pits; crest margin smooth, apex distinct, no median ridge; elytra with median band, setae appressed. Males with elytra and legs unmodified; fifth sternite emarginate, circular impression before apex; penis and parameres simple. Females with elytra prolonged at the apices.

The species included are *talpa* LaFerte, *photus* n. sp. and *pygidialis* n. sp.

Notoxus talpa LaFerté

(Figs. 42. 63)

Notoxus talpa LaFerté 1848: 50. Type locality: "California" (probably the area near Mexico City). Type series in MHNH. Pic 1911: 12.

Notoxus elegantulus LaFerte 1848: 52, Table 21, fig. 17. Type locality: "California" (probably the area near Mexico City). Type in MHNH.
NEW SYNONYMY.

Notoxus ventralis Champion 1890: 207-8, Table IX, fig. 17. Type series localities: Guanajuato, Guanajuato; and Jalapa, Veracruz, MEXICO. Types in BMNH. Champion 1893: 461. Pic 1894: 47; 1911: 13. NEW SYNONYMY.

Length 2.75-3.78. Head and pronotum orange to brown, elytra tan with brown markings: irregular median band usually reaching circular mark covering omoplates and base of elytra, apical band and median band usually forming tan postmedian W-shaped band, specimens from Michoacan with elytra all brown. Pubescence brownish when arising from dark areas, whitish in light areas. Setae appressed on pronotum, decumbent on elytra, average angle 13°. Mandibular explanation moderately wide, hind margin meeting mandible at lower level than front margin. Pronotum with pubescent antebasal band widely broken. Horn without pits beneath, 0-4 teeth on margin. Crest margin smooth, apex distinct, usually pointed. First and second protarso-meres with strong spur on posterior apical margin.

Males with fifth sternite emarginate, small circular impression at apex in larger, poorly-defined circular impression.

Females with fifth sternite rounded-triangular. Elytra with apices abruptly pointed.

Redescribed ♂: 4 mi E Zacatecas, Zacatecas, MEXICO (DSC). Length 3.82. Head 0.80 long, eye 0.29 long, raised setae above eyes average 0.08 long; antennomere ratios: I 2.47, II 1.62, III 2.21, IV 1.73, V 1.81, VIII

1.22, X 1.22, XI 2.26; fourth maxillary palpus 0.26 long, 0.12 wide; mandibular explanation 0.10 long, 0.06 wide. Pronotum 1.31 long, length from base to point of greatest width 0.39, break in antebasal pubescent band 0.37 wide; horn 0.61 long, 0.41 wide at base, apex pointed, no teeth on margin; crest 0.34 long, 0.14 wide at base; crest apex 0.08 above horn margin, horn apex 0.24 from crest apex; pronotal pit 0.14 long. Elytral setae 0.11 long, average angle 15°. Emargination of fifth sternite 0.16 wide, 0.02 deep.

Specimens examined, 106: MEXICO: Durango: 26 mi W Durango. Zacatecas: Sombrerete, 6000'; 4 mi E Zacatecas. Aguascalientes: 8 mi N Aguascalientes, 6700'. Guanajuato: Guanajuato, type of *N. ventralis*. Queretaro: 10 mi E San Juan del Rio; 1 mi S Palmillas. Mexico: Texcoco; Atlacomulco; Tepotzotlan; 15 mi NW Toluca. Distrito Federal: Chapultepec; Coapa, Mexico, Tlalpan. Michoacan: 11 mi SE Carapan; Uruapan; 10 mi E Zamora on Highway 15; Tancitaro; 3 mi S Carapan. Veracruz: Jalapa, type of *N. ventralis*. Oaxaca: Yagul ruins; 10 mi N Miltepec. Specimens in collections of: CASC, CNCI, DSC, FGW, LACM, MSUC, TAMU, TTCC, USNM.

Distribution: The central plateau to the higher areas of Oaxaca. Collected on beans, under low vegetation in corn field, and in squash flowers. Attracted to light, cantharidin and freshly killed meloid beetles. Present from June through August.

Discussion: This species is most similar to *pygidialis*. The males can be separated by the shallow impression of the fifth sternite which is never obscured by setae. The females have the pygidium simple, not projecting.

Notoxus pygidialis, n. sp.

(Figs. 43, 63)

Length 2.65-3.48. Head and pronotum red-brown to brown, elytra tan with brown markings: median band advancing anteriorly along elytral suture to cover omoplates, apical band advancing anteriorly along elytral suture, usually meeting postmedian band, anterior flanks dark. Pubescence brownish when arising from markings, yellowish in light areas. Setae appressed on pronotum, decumbent on elytra, average angle 16°. Mandibular explanation moderately wide, hind margin meeting mandible at lower level than front margin. Pronotum with pubescent antebasal band widely broken. Horn without pits beneath, 0-2 teeth on margin. Crest margin smooth, apex distinct, usually pointed. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite emarginate, circular impression before apex, may be shallowly or deeply impressed with dense setae around margin.

Females with fifth sternite rounded-triangular. Elytra slightly truncated, last tergite prolonged apically into distinct protuberance.

♂ holotype: Zacaletco, Tlaxcala, MEXICO. Length 2.81. Head 0.68 long, eye 0.22 long, raised setae above eyes average 0.06 long; antennomere ratios: I 2.53, II 1.55, III 2.18, IV 1.67, V 1.67, VIII 1.30, X 1.05, XI 2.25; fourth maxillary palpus 0.19 long, 0.10 wide; mandibular explanation 0.10 long, 0.06 wide. Pronotum 1.00 long, length from base to point of greatest width 0.28, break in antebasal pubescent band 0.23 wide; horn 0.46 long, 0.28 wide at base, no teeth on margin; crest 0.30 long, 0.11 wide at base; crest apex 0.06 above horn margin, horn apex 0.19 from crest apex; pronotal pit 0.09 long. Elytral setae 0.07 long, average angle 12°. Emargination of fifth sternite 0.10 wide, 0.04 deep.

Specimens examined, 124: HOLOTYPE ♂, ZacaTELCO, Tlaxcala, MEXICO, 26 July 1974, R. L. Mangan & D. S. Chandler, under low vegetation in corn field (USNM). PARATYPES: MEXICO: Tlaxcala: 21♂♂, 24♀♀, eutopotypical (DSC); 2♂♂, 5♀♀, Tepeyanco, 25 June 1975, D. S. Chandler, under low plants in corn field (DSC); 3♂♂, Xicohtzinco, 25 June 1975, D. S. Chandler, under low plants in corn field (DSC). Puebla: 1♀, Puebla, 3 July 1952, C. D. MacNeill (CISC); 6♂♂, 8♀♀, 3 mi E Acatepec, 26 June 1975, D. S. Chandler, under low plants in corn field (DSC); 10♂♂, 4♀♀, same data except, cantharidin trap (DSC); 1♂, 5 mi SW Chipilo, 26 June 1975, D. S. Chandler, sweeping low vegetation (DSC); 7♂♂, 3♀♀, same data except, cantharidin trap (DSC); 10♂♂, same data except, meloid trap (DSC); 10♂♂, 2♀♀, 1 mi E Cholula, 26 June 1975, D. S. Chandler, cantharidin trap (DSC). Morelos: 1♂, Cuernavaca (MCZC); 1♂, 9 km W Tres Cumbres, 7600', Rt. 3, km 60, 24 June 1948, F. Werner & W. Nutting, pine clearing (FGW). Oaxaca: 2♂♂, 10 mi NE Huajuapan de Leon, 25 June 1965, Burke, Meyer, Schaffner (TAMU).

Distribution: South-central Mexico. Collected sweeping low vegetation and under low vegetation in corn field. Attracted to cantharidin and freshly killed meloid beetles. Present in June and July.

Discussion: It is most similar to *talpa* and cannot be separated except by the sexual characters. The males can usually be separated by the deeper and densely setate margin of the impression of the fifth sternite. The females are very distinctive in having the apically produced pygidium.

Notoxus photus, n. sp.

(Figs. 44, 63)

Length 3.00-3.60. Head and pronotum tan to red-brown, elytra tan to red-brown with brown markings: median band often reaching circular mark covering omoplates, apical band extending anteriorly along elytral suture. Pubescence brownish in markings, whitish over rest of body. Setae appressed on pronotum and elytra, average angle on elytra 10°. Mandibular explanation narrow, front and hind margins meeting at mandible on same level. Pronotum with pubescent antebasal band widely broken. Horn without pits beneath, 0-4 teeth on margin. Crest margin smooth, apex distinct, usually rounded. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite slightly emarginate, circular impression before apex.

Females with fifth sternite rounded-triangular. Elytra truncated, apices spinose.

♂ holotype: Superior, Boyce-Thompson Arboretum, 2500', Gila County, Arizona. Length 3.16. Head 0.71 long, eye 0.26 long, raised setae above eyes average 0.09 long; antennomere ratios: I 2.54, II 1.67, III 2.23, IV 1.85, V 1.74, VIII 1.50, X 1.27, XI 2.11; fourth maxillary palpus 0.20 long, 0.10 wide; mandibular explanation 0.10 long, 0.06 wide. Pronotum 1.02 long, length from base to point of greatest width 0.34, break in antebasal pubescent band 0.30 wide; horn 0.44 long, 0.31 wide at base, 1 tooth on margin; crest 0.32 long, 0.10 wide at base, apex pointed; crest apex 0.05 above horn margin, horn apex 0.17 from crest apex; pronotal pit 0.10 long. Elytral setae 0.08 long, average angle 10°. Emargination of fifth sternite shallow, 0.16 wide.

Specimens examined, 199: HOLOTYPE ♂, Superior, Boyce-Thompson Arboretum, 2500', Gila Co., Arizona, 31 July 1948, H. K. Gloyd, white light

trap (USNM). PARATYPES: Arizona: Pima Co., Tucson; Santa Catalina foothills; I. B. P. site, Santa Rita Range Reserve; Colossal Cave County Park; Santa Catalina Mtns., Molino Canyon and Sabino Canyon; Brown Canyon, E slope Babaquivari Mtns. Santa Cruz Co.: Patagonia; 2 mi SW Patagonia; Pajarito Mtns., Peña Blanca Canyon and Sycamore Canyon; Madera Canyon, Santa Rita Mtns. Cochise Co.: Wood Canyon, Bisbee; Cochise Stronghold and West Stronghold, Dragoon Mtns.; Southwest Research Station, Chiricahua Mtns. MEXICO: Chihuahua: 12 mi N Chihuahua. Paratypes in collections of: CASC, CDAE, DSC, FGW.

Distribution: Associated with the oak-juniper zone through southeastern Arizona and south into Chihuahua. The only collection data is that most specimens were collected at light or ultra-violet light. Females are poorly attracted to light as only two are included in the type series. Present from June through September.

Discussion: It is most similar to *talpa*. Easily distinguished by the lighter appearance of the species. The shallow circular impression of the male fifth sternite is similar to that of *talpa*. The female elytral apices are very acute, while those of *talpa* are usually more rounded.

Monoceros-group

The *monoceros*-group is defined as those *Notoxus* with the following characters: mandibular explanation narrow, hind margin obsolete; raised pronotal setae distinct, pubescent antebasal band widely broken; horn without lateral pits; crest margin and apex variable, no median ridge; elytra with preapical band, raised setae present. Males with lateral apical tubercles on the elytra; fifth sternite truncate to shallowly emarginate; penis greatly modified, asymmetrical with dorsal surface as a plate or as a left-directed hook; parameres simple.

Species represented in Mexico are *anchora* Hentz and *serratus* LeConte. Only a single specimen of each has been collected. North American species included are *nevadensis* Casey, *pictus* Casey and *robustus* Casey. There are thirteen Palearctic species which were covered by Heberdey in 1936.

Notoxus anchorae Hentz

(Figs. 50, 64)

Notoxus anchorae Hentz 1827: 375, Table 13, fig. 4. Type locality: Massachusetts. LaFerté 1848: 33. LeConte 1852: 92. Horn 1884: 173. Casey 1895: 757. Pic 1911: 5. Leng 1920: 162.

Monocerus anchorae, LeConte 1847: 89.

Length 2.99-4.38. Head and pronotum tan to brown, elytra tan with brown markings: preapical band extending anteriorly along elytral suture over omo-plates to base of elytra, median lateral marks often attached to preapical band. Pubescence brownish when arising from markings, yellowish over rest of elytra. Raised setae long and erect on pronotum and elytra, average angle on elytra 62°. Mandibular explanation narrow, hind margin indistinct, meeting mandible at lower level than front margin. Pronotum with antebasal pubescent band widely broken. Horn without pits beneath, 3-10 teeth on margin. Crest margin crenulate, anterior margin pointed and indistinctly merging with horn.

First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite truncate at apex, elytra with lateral apical tubercles. Penis with ventral surface modified into a left-directed hook, dorsal surface forming two broad lobes which have two smaller lobes at each apex.

Females with fifth sternite rounded-triangular.

Redescribed ♂: 1 mi W Nichols, New York (DSC). Length 3.15. Head 0.67 long, eye 0.26 long, raised setae above eyes average 0.12 long: antennomere ratios: I 2.50, II 1.67, III 2.00, IV 1.77, V 1.80, VIII 1.62, X 1.32, XI 2.37; fourth maxillary palpus 0.20 long, 0.10 wide; mandibular explanation 0.10 long, 0.03 wide. Pronotum 1.02 long, length from base to point of greatest width 0.31, break in antebasal pubescent band 0.24 wide; horn 0.43 long, 0.24 wide at base, 6 teeth on margin; crest 0.34 long, 0.18 wide at base; crest apex merging with horn, horn apex 0.16 from crest apex; pronotal pit 0.15 long. Raised elytral setae 0.15 long, average angle 72°. Truncation of fifth sternite 0.10 wide.

Specimens examined, 1: "Mex." (MCZC).

Distribution: Northeastern United States south through the Rocky Mountains. This species is probably found in the northern mountains near the United States border. Collected in the United States by sweeping alfalfa and is attracted to cantharidin. Present in the United States from June through August.

Discussion. It is most similar to *nevadensis* by the crenulate crest margin and the indistinct crest apex. It can be separated by the narrow horn and the presence of a left-directed hook as the ventral portion of the penis. *N. nevadensis* has two narrow lobes at the apex of the ventral plate. *N. robustus* has the crest margin rounded-crenulate, the apex never breaks down anteriorly and merges with the horn.

Notoxus serratus (LeConte)

(Figs. 51, 64)

Monocerus serratus LeConte 1847: 90. Type locality: Rocky Mountains.

MCZC Type #4894, ♂.

Notoxus serratus, LeConte 1852: 93. Horn 1884: 172. Pic 1911: 11. Casey 1895: 758. Leng 1920: 163.

Notoxus digitatus LeConte 1876: 518. Type locality: southern Colorado.

MCZC Type #4895, ♂.

Notoxus vandykei Blaisdell 1929: 57-9. Type locality: Little Cottonwood Creek, Inyo County, California. CASC Type #2616, ♂. Leng 1933: 26.

Length 3.19-4.60. Head and pronotum red-brown, elytra tan with brown markings: circular mark on omoplates, preapical band often broken along elytral suture, extending anteriorly along elytral suture, rarely reaching omoplates, often with lateral marks in median portion of elytra, all marks may be joined, separated or absent. Pubescence brownish in dark areas, yellowish over rest of body. Raised setae long and erect on pronotum and elytra, average angle on elytra 58°. Mandibular explanation narrow, with hind margin meeting mandible at lower level than front margin. Pronotum with antebasal pubescent band widely broken. Horn without pits beneath, 6-10 teeth on margin; crest margin smooth, apex distinct, usually pointed. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite emarginate at apex. Penis with ventral surface modified into a left-directed hook, dorsal surface forming two broad lobes.

Each elytron with lateral apical tubercle.

Females with fifth sternite rounded-triangular.

Redescribed ♂: Hallelujah Junction, Lassen County, California (DSC). Length 4.40. Head 0.89 long, eye 0.32 long, raised setae above eyes average 0.20 long; antennomere ratios: I 2.50, II 2.00, III 2.50, IV 1.57, V 2.00, VIII 1.90, X 1.67, XI 2.85; fourth maxillary palpus 0.25 long, 0.14 wide; mandibular explanation 0.16 long, 0.06 wide. Pronotum 1.33 long, length from base to point of greatest width 0.45, break in antebasal pubescent band 0.30 wide; horn 0.58 long, 0.32 wide at base, apex pointed, 7 teeth on margin; crest 0.35 long, 0.12 wide at base, apex pointed; crest apex 0.12 above horn margin, horn apex 0.30 from crest apex; pronotal pit 0.11 long. Raised elytral setae 0.25 long, average angle 68°. Emargination of fifth sternite 0.23 wide, 0.01 deep.

Specimens examined, 1 MEXICO: Chihuahua: 48 km S Juarez, 28 April 1974, D. Giuliani, sand dunes, (CDAE).

Distribution: Montane regions of the western United States and northern Mexico. Collected on grass and *Salix*. Attracted to light, ultra-violet light and cantharidin. Present in the United States from April to September.

Discussion: It is most similar to *pictus* by the high smooth crest margin and is separated by having more than four teeth on the horn margin. It is also similar to *robustus*, but can be separated by the non-crenulate crest margin. Some specimens of *robustus* have crests approaching the smoothness of *serratus*, which can then only be separated by the males of *robustus* possessing a tubercle on the pro- and mesofemora.

Sparsus-group

The *sparsus*-group is defined as those *Notoxus* with the following characters: mandibular explanation wide, hind margin prominent; pronotum with raised setae distinct, pubescent antebasal band complete to widely broken; horn without lateral pits; crest margin and apex variable. Males with lateral apical tubercles on the elytra. The fifth sternite rounded or truncate at apex, with oval impression before apex; parameres simple; penis often thickened dorsoventrally and with preapical notch.

The group is basically Californian with two species, *sparsus* LeConte and *conformis* LeConte, extending south into Baja California. *N. baje* n. sp. is restricted to Baja California Sur. The United States species included in the group are *cavicornis* LeConte, *denudatus* Horn, *lustrellus* Casey, *spatulifer* Casey, *breviusculus* Fall and *obesulus* Blaisdell.

Notoxus sparsus LeConte

(Figs. 52, 64)

Notoxus sparsus LeConte 1859: 284-5. Type locality: Point Reyes, California. MCZC Type #4898, ♂. Horn 1884: 176 (synonym of *conformis* LeConte). Casey 1895: 757. Pic 1911: 7 (synonym of *conformis*). Leng 1920: 162 (synonym of *conformis*).

Length 2.42-3.08. Head and pronotum red-brown, elytra yellow-brown with brown markings: posthumeral marks on flanks usually joining oval mark on omoplates to form postbasal band, postmedian band usually advanced narrowly along elytral suture, elytral apices obscurely darkened. Pubescence

brownish when arising from marks, whitish over rest of body. Raised setae long and erect on pronotum and elytra, average angle on elytra 48° . Mandibular explanation wide, with front and hind margins on same level at mandible. Pronotum with antebasal pubescent band complete. Horn without pits beneath, 0-3 teeth on margin. Crest margin smooth, rounded and indistinct anteriorly, entire crest only slightly elevated above distinct margin. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite truncate, slight circular impression anterior to apical margin. Penis swollen dorsoventrally, with shallow dorsal notch near apex.

Females with fifth sternite triangular, elytra truncated at apex.

Redescribed ♂: 12 mi SW Red Bluff, Tehama County, California (DSC). Length 3.08. Head 0.72 long, eye 0.24 long, raised setae above eyes average 0.21 long; antennomere ratios: I 2.53, II 1.84, III 2.59, IV 2.08, V 2.15, VIII 1.71, X 1.34, XI 2.36; fourth maxillary palpus 0.19 long, 0.10 wide; mandibular explanation 0.10 long, 0.05 wide. Pronotum 1.10 long, length from base to point of greatest width 0.32; horn 0.44 long, 0.22 wide at base, 1 tooth on margin; crest 0.29 long, 0.10 wide at base; crest apex 0.04 above horn margin, horn apex 0.20 from crest apex; pronotal pit 0.09 long. Raised elytral setae 0.20 long, average angle of setae 45° . Truncation of fifth sternite 0.12 wide.

Specimens examined, 1: MEXICO: Baja California: Sierra Juarez, 1 mi N El Compadre, 23 January 1965, E. L. Sleeper (CDAE).

Distribution: Through central and coastal California to the northern portion of Baja California. Collected in oak litter in California. Attracted to white light and is present throughout the year in southern California.

Discussion: It is most similar to an undescribed species from California by the long, raised setae on the elytra and the globular (rather than transverse) pronotum. It is best separated by the genitalia with the penis having a distinct shallow preapical notch.

Despite being synonymized under *conformis* by several authors, *sparsus* is easily separated by the elevated tactile setae on the elytra.

Notoxus bajae, n. sp.

(Figs. 54, 64)

♂ holotype: 25 mi W La Paz, Baja California Sur, MEXICO (USNM). Head and pronotum tan, elytra tan with brown markings: mark on omoplates, irregular postmedian band extending anteriorly along elytral suture to near omoplates, posthumeral mark on flanks. Pubescence brownish when arising from markings, yellowish over rest of body. Raised setae long and erect on pronotum and elytra, average angle on elytra 67° . Mandibular explanation wide, with front and hind margins on same level at mandible. Pronotum with antebasal pubescent band complete. Horn without pits beneath, no teeth on margin. Crest margin smooth, rounded and distinct anteriorly. First and second protarsomeres with strong spur on posterior apical margin.

Male with fifth sternite truncate at apex, circular depressed area anterior to margin. Penis with dorsal notch near apex.

Length 4.04. Head 0.86 long, eye 0.28 long, raised setae over eyes average 0.28 long; antennomere ratios: I 2.04, II 2.46, III 2.00, IV 2.33, V 2.06, VIII 1.55, X 1.60, XI 2.37; fourth maxillary palpus 0.21 long, 0.08 wide; mandibular explanation 0.14 long, 0.09 wide. Pronotum 1.32 long, length

from base to point of greatest width 0.40, horn 0.58 long, 0.29 wide at base, no teeth on margin; crest 0.40 long, 0.10 wide at base; crest apex 0.15 above horn margin, horn apex 0.28 from crest apex; pronotal pit 0.13 long. Raised elytral setae 0.26 long. Truncation of fifth sternite 0.18 wide.

Specimens examined, 1: HOLOTYPE ♂, 25 mi W La Paz, Baja California Sur, MEXICO, 4 September 1959, K. W. Radford & F. G. Werner, light trap (USNM).

Distribution: The single specimen is from southern Baja California Sur and was collected at light.

Discussion: It is distinct in the group by having the crest half as wide at base as at the greatest width and having the crest well-elevated above the horn margin. The penis is similar to that of *spatulifer* by the dorsal preapical slit, but the apex is simple, not flattened and dilated.

Notoxus conformis LeConte

(Figs. 53, 64)

Notoxus conformis LeConte 1851: 152. Type locality: Gila River, Arizona.

MCZC Type #4896, ♀. LeConte 1852: 92-3. Horn 1884: 174. Casey 1895: 757. Fall 1902: 33, 182. Pic 1911: 7. Leng 1920: 162.

Length 2.60-3.46. Head and pronotum reddish-brown, brown markings on reddish-brown elytra: mark on omoplates offset toward elytral suture, frequently postmedial band extends along elytral suture to meet omoplate marks, posthumeral marks on flanks on elytra, often reaching to postmedian band, obscure darkened band near elytral apices. Pubescence brownish when arising from dark areas, whitish over rest of body. Short scattered raised setae on pronotum, on elytra setae appressed, average angle 10°. Mandibular explanation moderately wide, with front and hind margins on same level at mandible. Pronotum with antebasal pubescent band complete. Horn without pits beneath, 0-2 teeth on margin. Crest smooth, anterior margin rounded, only slightly elevated above horn margin. First and second protarsomeres lacking spur on apical posterior margin.

Males with fifth sternite truncate, circular impression before apex which may be faint, elytra with lateral apical tubercles, anterior margin of crest usually distinct. Penis swollen dorso-ventrally, with deep dorsal notch near apex.

Females with fifth sternite rounded-triangular; anterior margin of crest indistinct, breaking down and merging with horn; elytra appearing slightly truncated; body appearing stouter than males.

♂: Hemet, Riverside County, California (DSC). Length 3.46. Head 0.76 long, eye 0.26 long, raised setae over eyes average 0.16 long; antennomere ratios: I 2.56, II 1.64, III 2.50, IV 2.01, V 2.20, VIII 1.63, X 1.37, XI 2.10; fourth maxillary palpus 0.21 long, 0.12 wide; mandibular explanation 0.12 long, 0.06 wide. Pronotum 1.24 long, length from base to point of greatest width 0.34; horn 0.55 long, 0.32 wide at base, 1 tooth on margin; crest 0.31 long, 0.15 wide at base; crest apex 0.02 above horn margin, horn apex 0.23 from crest apex; pronotal pit 0.08 long. Elytral setae 0.10 long, average angle 13°. Truncation of fifth sternite 0.12 wide.

Specimens examined, 19: MEXICO: Baja California: Sierra San Pedro Martir, La Sanja, 6500', 27 May 1958, J. Powell (CISC); 2.4 mi SE El Consuelo, 24 April 1963, H. B. Leech & P. H. Arnaud, Jr. (CASC).

Distribution: Found in hilly and montane areas of California, Arizona and Baja California. Collected by beating vegetation, sifting oak duff, and has been found on dead yucca and in a swallow nest. Present from February to November in California.

Discussion: It is most similar to *lustrellus* by the decumbent elytral setae. It can be easily separated by the smooth crest margin and few teeth on the horn margin. *N. lustrellus* has the crest crenulate and about five teeth on the horn margin.

Species Not Placed In Groups

The Central American species not placed in any group are *crucifer* Champion, *opacus* Champion, *fraternus* Champion, *truncatipennis* Champion, *aztecorum* n. sp., *campus* n. sp. *stephani* n. sp., *desperatus* n. sp., *zapotecorum* n. sp. and *occidentalis* n. sp. United States species not placed in any group are *brevicornis* Fall and an undescribed species from Texas. An unidentified *Notoxus* female of probable Old World origin is included in this section.

Notoxus occidentalis, n. sp.

(Figs. 12, 55)

Notoxus bifasciatus, Pallister 1955: 6, misidentification.

Length 3.00-3.30. Head and pronotum red-brown to brown, elytra red-brown with brown markings: median band extending anteriorly along elytral suture to cover omoplates, apical band may extend anteriorly along elytral suture to join median band. Pubescence brownish when arising from dark areas, whitish in lighter areas. Raised setae long and erect on pronotum and elytra, average angle on elytra 55°. Mandibular explanation moderately wide, front and hind margins meeting at mandible on same level. Pronotum with pubescent antebasal band widely broken. Horn without pits beneath, no teeth on margin. Crest margin smooth, apex pointed and distinct. First and second protarsomeres with strong spur on posterior apical margin.

Males unknown.

Females with fifth sternite rounded-triangular.

♀ holotype: San Jose Babicora, Chihuahua, MEXICO. (AMNH). Length 3.00. Head 0.70 long, eye 0.23 long, raised setae over eyes average 0.20 long; antennomere ratios: I 2.47, II 1.73, III 2.08, IV 1.79, V 1.67, VIII 1.50, X 1.33, XI 1.84; fourth maxillary palpus 0.17 long, 0.09 wide; mandibular explanation 0.10 long, 0.06 wide. Pronotum 1.04 long, length from base to point of greatest width 0.35, break in antebasal pubescent band 0.20 wide; horn 0.42 long, 0.28 wide at base; crest 0.28 long, 0.10 wide at base; crest apex 0.10 above horn margin, horn apex 0.25 from crest apex; pronotal pit 0.08 long. Raised elytral setae 0.20 long, average angle 49°.

Specimens examined, 2: HOLOTYPE ♀, San Jose Babicora, Chihuahua, MEXICO, 5 June 1947, Michener (AMNH). PARATYPE: 1♀, Palos Colorados, 8000', Durango, MEXICO, 5 August 1947, Cazier (DSC).

Distribution: The Sierra Madre Occidental. Adults present from June to August.

Discussion: Collection of the males will be necessary before this species

can be placed positively in a group. The species is either a member of the *montanus*- or *pueblensis*-groups. Pallister (1955) identified the type series as *Notoxus bifasciatus* (LeConte), a species which occurs only in northern and eastern United States.

Notoxus fraternus Champion
(Figs. 45, 61)

Notoxus fraternus Champion 1890: 208-9. Type series localities: Guanajuato, Guanajuato (BMNH) and Jalapa, Veracruz (FGW), MEXICO. Pic 1894: 47; 1911: 8. Not Pallister 1955: 8.

Length 2.58-3.45. Head and pronotum brown to dark brown, elytra brown to dark brown, rarely with faint lighter marks laterally behind omoplates and laterally in apical half. Brownish setae forming vague median band, extending anteriorly near elytral suture to cover omoplates, narrow band of white setae behind median band, followed by brownish setae to apex. Upraised setae present on pronotum, setae on elytra decumbent, average angle 12°. Mandibular explanation narrow, with hind margin often meeting mandible at lower level than front margin. Pronotum with pubescent antebasal band widely broken. Horn without pits beneath, 0-1 teeth on margin. Crest margin smooth, apex distinct, usually rounded. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite emarginate at apex, transverse impression before apex.

Females with fifth sternite rounded-triangular.

Redescribed ♂: 4 mi SW Perote, Veracruz, MEXICO (DSC). Length 3.04. Head 0.68 long, eye 0.20 long, raised setae above eyes average 0.12 long; antennomere ratios: I 2.65, II 1.59, III 2.34, IV 1.84, V 1.93, VIII 1.35, X 1.21, XI 2.15; fourth maxillary palpus 0.16 long, 0.10 wide; mandibular explanation 0.11 long, 0.05 wide. Pronotum 1.00 long, length from base to point of greatest width 0.34, break in antebasal pubescent band 0.28 wide; horn 0.38 long, 0.28 wide at base, no teeth on margin; crest 0.28 long, 0.11 wide at base, apex rounded; crest apex 0.07 above horn margin, horn apex 0.14 from crest apex; pronotal pit 0.10 long. Elytral setae 0.09 long, average angle 14°. Emargination of fifth sternite 0.20 wide, 0.01 deep.

Specimens examined, 266: MEXICO: Guanajuato: Guanajuato, type of *fraternus*. Michoacan: 2 mi SE Los Reyes. Mexico: 7 mi S Amecameca, 8000'. Distrito Federal: 2 km S Mexico, 8600'; 16 mi S Mexico City, 7400'; 37 km S Mexico City; Guadalupe; Tlalpan. Tlaxcala: Xicohtzinco. Puebla: 7 mi NE Atlixco; 13.8 mi SW Alchichica. Veracruz: 4 mi SW Perote; 10 mi SW Parote; Jalapa. Specimens in collections of: CASC, CISC, CNCI, CUIC, DSC, FGW, MCZC, TAMU, USNM.

Distribution: The higher areas of south-central Mexico. Collected on corn, on the ground in a moist agricultural area and under low plants in corn field. Attracted to freshly killed meloid beetles. Present from June through August.

Discussion: It is generally similar to *truncatipennis* by the smooth crest margin and the emarginate fifth sternite. It is separated by the decumbent elytral setae, the more elevated crest and the transverse impression before the down-curved apex of the male fifth sternite.

Notoxus stephani, n. sp.

(Figs. 39, 61)

Length 2.99-4.37. Head and pronotum orange to brown, elytra tan to red-brown with brown markings: oval mark covering omoplates often joined to slightly postmedian band along elytral suture, apical band joined to postmedian band along elytral suture. Pubescence brownish when arising from dark areas, whitish in light areas. Raised setae distinct on pronotum, and elytra, average angle on elytra 32°. Mandibular explanation moderately wide, front and hind margins often meeting on same level at mandible. Pronotum with antebasal pubescent band widely broken. Horn without pits beneath, 0-1 teeth on margin. Crest margin smooth apex usually pointed, apex indistinct and merging with horn when pointed. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite emarginate into large circular impression.

Females with fifth sternite rounded-triangular.

♂ holotype: 5 mi E Alamos, Sonora, MEXICO. Length 4.09. Head 0.84 long, eye 0.30 long, raised setae above eyes average 0.10 long; antennomere ratios: I 2.38, II 1.50, III 2.13, IV 1.81, V 2.00, VIII 1.39, X 1.16, XI 2.17; fourth maxillary palpus 0.18 long, 0.12 wide; mandibular explanation 0.12 long, 0.04 wide. Pronotum 1.32 long, length from base to point of greatest width 0.42, break in antebasal pubescent band 0.30 wide; horn 0.58 long, 0.36 wide at base, 1 tooth on margin; crest 0.42 long, 0.14 wide at base, apex pointed; crest apex 0.02 over horn margin, horn apex 0.24 from crest apex; pronotal pit 0.12 long. Raised elytral setae 0.11 long, average angle 41°. Emargination of fifth sternite 0.15 wide, 0.01 deep.

Specimens examined, 19: HOLOTYPE ♂, 5 mi E Alamos, Sonora, MEXICO, 11 August 1973, K. Stephan & D. S. Chandler, blacklight (USNM). PARATYPES: MEXICO: Sonora: 9♂♂, 1♀, eutopotypical (DSC). Jalisco: 1♀, Guadalajara, 12 August 1903, J. F. McClendon (MCZC); 1♀, same locality, 1 August 1903 (MCZC); 1♀, same locality, 8 August 1903 (MCZC); 1♂, 9 mi W Guadalajara, 1550 meters, 16 July 1947, T. H. Hubbell, on Tequila pd. (CASC); 1♂, 13 mi W Guadalajara, 21 August 1964, H. R. Burke & J. Apperson (TAMU); 1♂, 4 mi SW Jalostotitlan, 4 August 1954, E. G. Linsley, J. W. MacSwain, R. F. Smith (CISC); 1♂, 2 mi S Tlaquepaque, 11 July 1953, C. & P. Vaurie (AMNH); 1♂, 6 mi SE Sayula, 23 July 1966, P. M. & P. K. Wagner (TAMU). Zacatecas: 1♂, 10 mi WSW Huejucar, 7200', 22 July 1954, R. H. Brewer (CASC).

Distribution: The semi-tropical regions on the west coast of Mexico. Collected by sweeping and found on a Tequila pod. Attracted to ultra-violet light. Present from July to August.

Discussion: It is most similar to *truncatipennis* by the low-lying, smoothly margined crest and the emarginate male fifth sternite. Easily separated in the males by the deep circular impression at the apex of the fifth sternite.

Notoxus aztecorum, n. sp.

(Figs. 36, 61)

Length 2.91-3.34. Head and pronotum red-brown to brown, elytra tan with brown markings: postmedian band extending anteriorly along elytral

suture to base, apical band extending anteriorly along elytral suture to postmedian band. Pubescence brownish when arising in dark areas, yellowish in tan areas. Raised setae distinct on pronotum and elytra, average angle on elytra 18° . Mandibular explanation moderately wide, front and hind margins meeting mandible at same level. Pronotum with antebasal pubescent band widely broken. Horn without pits beneath, no teeth on margin. Crest margin smooth, apex rounded and distinct. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite emarginate at apex.

Females with fifth sternite rounded-triangular.

♂ holotype: Mixcoac, Distrito Federal, MEXICO. Length 3.05. Head 0.65 long, eye 0.24 long, raised setae above eyes average 0.12 long; antennomere ratios: I 2.19, II 1.67, III 2.08, IV 1.70, V 1.74, VIII 1.05, X 0.92, XI 1.71; fourth maxillary palpus 0.18 long, 0.10 wide; mandibular explanation 0.10 long, 0.06 wide. Pronotum 0.98 long, length from base to point of greatest width 0.38, break in antebasal pubescent band 0.29 wide; horn 0.36 long, 0.30 wide at base; crest 0.28 long, 0.12 wide at base; crest apex 0.04 over horn margin, crest apex 0.14 from horn apex; pronotal pit 0.10 long. Raised setae 0.11 long, average angle 17° . Emargination of fifth sternite 0.23 wide, 0.05 deep.

Specimens examined, 3: HOLOTYPE ♂, Mixcoac, Distrito Federal, MEXICO, Wickham (USNM). PARATYPES: MEXICO: Distrito Federal: 1♂, Barrett (CASC); 1♀, Teotihuacan, 3 June 1948, F. Werner, ground (FGW).

Distribution: The region around Mexico City.

Discussion: It is most similar to *truncatipennis* and *desperatus*. Separated from the former by the lack of an impression on the male fifth sternite. It is separated from the latter by the lack of a carina on the male fifth sternite and the apically rounded penis.

Notoxus desperatus, n. sp.

(Figs. 38, 61)

Length 2.98-3.20. Head and pronotum orange to red-brown, elytra tan with brown markings: postmedian band extending anteriorly along elytral suture, covering omoplates and reaching base of elytra, apical band meeting postmedian band along elytral suture. Pubescence brownish when arising from markings, yellowish over rest of body. Raised setae present on pronotum and elytra, average angle on elytra 20° . Mandibular explanation moderately wide, front and hind margin meeting mandible at same level. Pronotum with antebasal pubescent band widely broken. Horn without pits beneath, no teeth on margin. Crest margin smooth, apex distinct, often pointed. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite emarginate, flattened and with transverse carina at center. Apex of penis widely split.

Females with fifth sternite rounded-triangular.

♂ holotype: Durango, Durango, MEXICO. Length 3.20. Head 0.68 long, eye 0.22 long, raised setae above eyes average 0.12 long; antennomeres missing; fourth maxillary palpus missing; mandibular explanation 0.12 long, 0.06 wide. Pronotum 1.02 long, length from base to point of greatest width 0.34, break in antebasal pubescent band 0.28 wide; horn 0.42 long, 0.32 wide at base; crest 0.30 long, 0.13 wide at base, apex pointed; crest apex 0.04 above horn margin, horn apex 0.12 from crest apex; pronotal pit 0.11 long. Raised

elytral setae 0.13 long, average angle 24°. Emargination of fifth sternite 0.26 wide, 0.04 deep.

Specimens examined, 3: HOLOTYPE ♂, Durango, Durango, MEXICO (USNM). PARATYPES: MEXICO: Durango: 1♂, eutopotypical (DSC); 1♀, Durango, Wickham (MCZC).

Distribution: Only known from near the city of Durango.

Discussion: It is most similar to *truncatipennis* and *aztecorum*. Separated from both by the medial transverse carina of the male fifth sternite and the apex of the penis being forked.

Notoxus truncatipennis Champion

(Figs. 37, 61)

Notoxus truncatipennis Champion 1890: 209. Type locality: Guanajuato, Guanajuato, MEXICO. BMNH Lectotype ♀, designated by D. S. Chandler, 1975. Pic 1894: 47; 1911: 13.

Length 2.78-2.94. Head and pronotum brown, elytra brown with red-brown markings: median band extending anteriorly along elytral suture over omoplates to base, apical band extending along elytral suture to median band. Pubescence brownish in dark areas, whitish in light areas. Raised setae present on pronotum and elytra, average angle on elytra 31°. Mandibular explanation wide, front and hind margins meeting mandible at same level. Pronotum with pubescent antebasal band widely broken. Horn without pits beneath, no teeth on margin. Crest margin smooth, apex pointed, usually distinct. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite emarginate, shallow transverse impression before apex.

Females with fifth sternite rounded-triangular.

Redescribed ♂: Ridge NW of Jocoque Dam, Aguascalientes, MEXICO (DSC). Length 2.78. Head 0.62 long, eye 0.21 long, raised setae above eyes average 0.09 long; antennomere ratios: I 2.15, II 1.55, III 2.28, IV 1.59, V 1.58, VIII 1.11, X 1.10, XI 2.00; fourth maxillary palpus 0.16 long, 0.09 wide; mandibular explanation 0.10 long, 0.07 wide. Pronotum 0.96 long, length from base to point of greatest width 0.32, break in antebasal pubescent band 0.25 wide; horn 0.42 long, 0.30 wide at base; crest 0.32 long, 0.11 wide at base, apex indistinctly merging with horn; crest apex 0.02 above horn margin, horn apex 0.16 from crest apex; pronotal pit 0.08 long. Raised elytral setae 0.09 long, average angle 32°. Emargination of fifth sternite 0.24 wide, 0.02 deep.

Specimens examined, 3: MEXICO: Aguascalientes: Ridge NW of Jocoque Dam, 19 August 1960, P. H. Arnaud, Jr., E. S. Ross, D. C. Rentz (CASC, DSC). Guanajuato: Guanajuato, Lectotype of *truncatipennis* (BMNH).

Distribution: On the southern margin of the Mexican Central Plateau.

Discussion: Similar to *aztecorum*, *desperatus*, *fraternus* and *stephani* by the low-lying, smoothly margined crest and the emarginate fifth sternite. Separated by the shallow medial impression of the fifth sternite of the male.

Notoxus zapotecorum, n. sp.

(Figs. 46, 62)

Length 2.75-3.38. Head and pronotum orange to red-brown, elytra tan with brown markings: circular marks covering omoplates, often meeting postmedian band extending along elytral suture, apical band extending along elytral suture to postmedian band. Pubescence brownish when arising from markings, yellowish in light areas. Raised setae distinct on pronotum and elytra, average angle on elytra 32°. Mandibular explanation narrow, often with margins not meeting mandible at same level. Pronotum with antebasal pubescent band widely broken. Horn without pits beneath, 2-7 teeth on margin. Crest margin smooth, apex usually rounded. First and second protarso-meres with strong spur on posterior apical margin.

Males with fifth sternite slightly emarginate, transverse impression before apex.

Females with fifth sternite rounded-triangular.

♂ holotype: Jesus Maria, Nayarit, MEXICO. Length 3.28. Head 0.68 long, eye 0.27 long, raised setae over eyes average 0.10 long; antennomere ratios: I 2.53, II 1.67, III 2.25, IV 2.00, V 1.74, VIII 1.82, X 1.21, XI 2.35; fourth maxillary palpus 0.20 long, 0.11 wide; mandibular explanation 0.10 long, 0.05 wide. Pronotum 1.09 long, length from base to point of greatest width 0.35, break in antebasal pubescent band 0.26 wide; horn 0.46 long, 0.32 wide at base, 2 teeth on margin; crest 0.29 long, 0.12 wide at base, apex rounded; crest apex 0.04 above horn margin, horn apex 0.16 from crest apex; pronotal pit 0.12 long. Raised elytral setae 0.11 long, average angle 33°. Emargination of fifth sternite 0.10 long, 0.01 deep.

Specimens examined, 23: HOLOTYPE ♂, Jesus Maria, Nayarit, MEXICO, 6 July 1955, B. Malkin (CASC). PARATYPES: MEXICO: Sinaloa: 2♂♂, Choix, 5 August 1968, T. A. Sears, R. C. Gardner, C. S. Glaser (UCDC); 2♂♂, 5.5 mi NW Choix, 14 July 1968, T. A. Sears, R. C. Gardner, C. S. Glaser (UCDC); 3♂♂, 8 mi S Elota, 26 August 1963, L. A. Stange (UCDC); 1♂, Culiacan, 17 August 1962, A. E. Michelbacher (CISC). Nayarit: 2♂♂, 3♀♀, Jesus Maria, 26 June 1955, B. Malkin (CISC). Puebla: 2♀♀, Tepexco, Route 115, 4000', 9 August 1965, G. E. Ball & D. R. Whitehead, blacklight (FGW); 1♀, 2 mi NW Tehuacan, 25 April 1953, R. C. Bechtel & E. I. Schlinger, sweeping alfalfa (CISC); 1♂, 6 mi SW Tehuacan, 7 July 1973, Mastro & Schaffner, at light (TAMU). Oaxaca: 3♂♂, 10 mi NW Oaxaca, 22 July 1974, R. L. Mangan & D. S. Chandler, attracted to box of drying Meloidae (DSC); 1♂, Huajuapan de Leon, 28 June 1971, C. W. O'Brien & G. B. Marshall (TTCC).

Distribution: Western and south-central Mexico. Collected sweeping alfalfa. Attracted to light, ultra-violet light and freshly killed meloid beetles. Present from April through August.

Discussion: It is most similar to *marginatus* of the *apicalis*-group. It can be separated by the shorter raised elytral setae, the moderately wide mandibular explanation and the smaller size.

Notoxus campus, n. sp.

(Figs. 31, 62)

Length 2.48-3.63. Head and pronotum orange to red-brown, elytra red-

brown, elytra red-brown to brown. Pubescence whitish over body. Raised setae long and erect on pronotum and elytra, average angle on elytra 32° . Mandibular explanation narrow, hind margin meeting mandible at lower level than front margin. Pronotum with pubescent antebasal band widely broken. Horn without pits beneath, 0-2 teeth on margin. Crest margin smooth, apex rounded and distinct. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite emarginate.

Females with fifth sternite rounded-triangular.

♂ holotype: km 210, Highway 57 N of San Luis Potosi, San Luis Potosi, MEXICO. Length 2.89. Head 0.62 long, eye 0.23 long, raised setae over eyes average 0.16 long; antennomere ratios: I 2.25, II 1.54, III 1.77, IV 1.75, V 1.50, VIII 1.56, X 1.25, XI 2.26; fourth maxillary palpus 0.17 long, 0.10 wide; mandibular explanation 0.12 long, 0.04 wide. Pronotum 1.00 long, length from base to point of greatest width 0.32, break in antebasal pubescent band 0.22 wide; horn 0.42 long, 0.28 wide at base, 1 tooth on margin; crest 0.25 long, 0.10 wide at base; crest apex 0.12 above horn margin, horn apex 0.27 from crest apex; pronotal pit 0.11 long. Raised elytral setae 0.17 long, average angle 35° . Emargination of fifth sternite 0.18 wide, 0.03 deep.

Specimens examined, 24: HOLOTYPE ♂, km 710, Highway 52 N of San Luis Potosi, San Luis Potosi, MEXICO, 11 July 1969, Ward, Tenorio, Bennett (USNM). PARATYPES: Coahuila: 1♂, 1♀, 21 mi SE Saltillo, 6000', 18 July 1963, H. F. Howden (CNCI); 2♂♂, 3♀♀, 33 mi SE Saltillo, nr. Jame, 7500', 18 July 1963, A. T. Howden (CNCI). Nuevo Leon: 2♂♂, 1♀, 10 mi S Junction 57 & 60, 23 June 1971, G. Brothers, acacia (TTCC). San Luis Potosi: 5♂♂, 8♀♀, eutopotypical (TTCC).

Distribution: East side of the Mexican central plateau.

Discussion: It is distinctive in the long erect setae on the unicolorous elytra. The mandibular explanation is narrow and the fifth sternite is emarginate without any impression.

Notoxus crucifer Champion

(Figs. 41, 62)

Notoxus crucifer Champion 1890: 210, Table IX, fig. 18. Type locality: San Gerónimo, Guatemala. BMNH Type ♀. Pic 1894: 46; 1911: 7.

Length 2.92-3.75. Head and pronotum red-brown to brown, elytra tan with brown markings: circular mark covering omoplates, median band often reaching omoplates along elytral suture, apical band often reaching median band along elytral suture. Pubescence brownish when arising from dark areas, whitish in light areas. Raised setae distinct on pronotum and elytra, average angle on elytra 42° . Mandibular explanation moderately wide, rarely with front and hind margins meeting mandible at same level. Pronotum with antebasal pubescent band widely broken. Horn without pits beneath, 3-8 teeth on margin. Crest margin often crenulate, apex pointed, usually indistinct and merging with horn. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite slightly emarginate, circular impression before apex.

Females with fifth sternite rounded-triangular. Elytral apices slightly pointed.

Redescribed ♂: Junction Highways 190 & 195, Chiapas, MEXICO (DSC). Length 3.65. Head 0.80 long, eye 0.30 long, raised setae over eyes average 0.11 long; antennomere ratios: I 2.32, II 1.57, III 2.20, IV 1.56, V 1.70, VIII 1.25, X 1.14, XI 2.33; fourth maxillary palpus 0.22 long, 0.13 wide; mandibular explanation 0.11 long, 0.04 wide. Pronotum 1.20 long, length from base to point of greatest width 0.38, break in antebasal pubescent band 0.30 wide; horn 0.52 long, 0.32 wide at base, 3 teeth on margin; crest 0.29 long, 0.10 wide at base, margin crenulate, apex indistinct and merging with horn; crest apex 0.04 over horn, horn apex 0.22 from crest apex; pronotal pit 0.12 long. Raised elytral setae 0.12 long, average angle 41°. Emargination of fifth sternite 0.15 wide, 0.01 deep.

Specimens examined, 18: MEXICO: Chiapas: Junction Highways 190 & 195, 20 May 1969, J. M. Campbell (CNCI); same locality, 6 June 1969, H. F. Howden & J. M. Campbell (CNCI); same locality, 24 June 1973, G. Ekis (DSC, USNM); 5 mi W San Cristobal, 7500', 23 May 1969, J. M. Campbell (CNCI); Zinacantlan, 1900 meters, 27 June 1973, G. Ekis (DSC). GUATEMALA: San Geronimo, Champion, Holotype female of *N. crucifer* (BMNH).

Distribution: Chiapas and Guatemala. Present from May through June.

Discussion: It is most similar to *opacus* by the usually crenulate crest margin, the moderately raised setae on the elytra, and the apical emargination of the male fifth sternite. It is separated by the shallow emargination and circular impression of the male fifth sternite, and the cylindrical first metatarsomere of the male.

Notoxus opacus Champion

(Figs. 40, 62)

Notoxus opacus Champion 1890: 207, Table IX, fig. 16. Type locality: Cerro de Plumas, Veracruz, MEXICO. Holotype ♂ in BMNH. Pic 1894: 47; 1911: 10. Not Pallister 1955: 6.

Length 3.45-3.85. Head and pronotum red-brown to brown, elytra red-brown to brown with dark brown markings: oval mark on omoplates often expanded laterally to form postbasal band, broken along elytral suture, often extending posteriorly along elytral suture to postmedian band, mark on apices extending anteriorly along elytral suture. Pubescence brownish when arising from marks, whitish over rest of body. Raised setae moderately long and erect on pronotum and elytra, average angle on elytra 40°. Mandibular explanation narrow, rarely with front and hind margins meeting mandible at same level. Pronotum with antebasal pubescent band widely broken. Horn without pits beneath 4-7 teeth on margin. Crest margin usually smooth, apex pointed, rarely with apex indistinct and merging with horn. First and second protarsomeres with strong spur on posterior apical margin.

Males with fifth sternite deeply emarginate, transversely impressed immediately before apex, first metatarsomeres enlarged and flattened.

Females with fifth sternite rounded-triangular.

Redescribed ♂: Puebla, Puebla, MEXICO (CASC). Length 3.38. Head 0.74 long, eye 0.26 long, raised setae over eyes average 0.13 long; antennomere ratios: I 2.50, II 1.25, III 2.50, IV 2.25, V 1.80, VIII 1.45, X 1.34, XI 2.26; fourth maxillary palpus 0.20 long, 0.11 wide; mandibular explanation 0.10 long, 0.04 wide. Pronotum 1.04 long, length from base to point of greatest width 0.32, break in antebasal pubescent band 0.25 wide; horn 0.44 long,

0.27 wide at base, 5 teeth on margin; crest 0.28 long, 0.08 wide at base, apex distinct and smooth; crest apex 0.04 above horn margin; horn apex 0.16 from crest apex; pronotal pit 0.12 long. Raised elytral setae 0.11 long, average angle 34°. Emargination of fifth sternite 0.15 wide, 0.02 deep.

Specimens examined, 6: MEXICO: Puebla: Puebla, May, A. Fenyes coll. (CASC); 5 mi SW Chipilo, 26 June 1975, D. S. Chandler, sweeping low vegetation (DSC). Oaxaca: 3.2 mi S Ocotlan, 20 July 1974, Clark, Murray, Ashe, Schaffner (TAMU); 30 mi NW Oaxaca, 6500', 27 June 1965, Burke, Meyer, Schaffner (DSC). The holotype record is from Veracruz.

Distribution: South-central Mexico. At 5 mi SW Chipilo two females were collected sweeping, while none were attracted to either cantharidin or drying meloid beetles which had been placed within thirty meters of the collection site. Present from May through July.

Discussion: It is most similar to *crucifer*. It is separated by the deep emargination and transverse impression of the male fifth sternite. The first metatarsomeres of the male are enlarged and flattened.

Notoxus sp.

(Figs. 17, 58)

♀: Foz do Iguacú, Paraná, BRAZIL (MGF). Body brown, no markings on elytra. Pubescence whitish. Raised setae long and erect on pronotum and elytra, average angle on elytra 47°. Mandibular explanation moderately wide, front and hind margins on same level at mandible. Pronotum with antebasal pubescent band widely separated. Horn without pits beneath, 6 teeth on margin. Crest margin serrate, apex pointed and indistinct. Carina extending from horn base to anterior margin of pronotal pits. First and second protarsomeres lacking large spur on posterior apical margin.

Male unknown.

Female with fifth sternite triangular.

Length 2.60. Head 0.58 long, eye 0.17 long, raised setae over eyes average 0.16 long; antennomere ratios: I 2.00, II 1.90, III 2.38, IV 2.25, V 2.25, antennomeres VII-XI missing; fourth maxillary palpus 0.16 long, 0.08 wide; mandibular explanation 0.08 long, 0.05 wide. Pronotum 0.91 long, length from base to point of greatest width 0.32, break in antebasal pubescent band 0.24 wide; horn 0.37 long, 0.29 wide at base; crest 0.24 long, 0.12 wide at base; crest apex merging into horn, horn apex 0.16 from crest apex; pronotal pit 0.11 long. Raised elytral setae 0.15 long.

♀: Foz do Iguacú, Paraná, BRAZIL, November 1955, G. B. Frey (MGF).

Distribution: Southern inland Brazil.

Discussion: This species is very distinct in the possession of lateral carinae between the horn base and the cervix. This character is found only in the African and Indian *Notoxus* with which this species has a high degree of resemblance. It is probable that this species has been introduced from the Old World and it will require the collection of the male in order to decide if the species has been described.

Incertae sedisNotoxus *dugesi* Pic

Notoxus Dugesi (sic) Pic 1901: 89. Type locality: Guanajuato, Guanajuato, MEXICO. Type in MNHN. Pic 1911: 7.

Pic's description of this species is typical in its brevity and gives no clues as to which species it could be.

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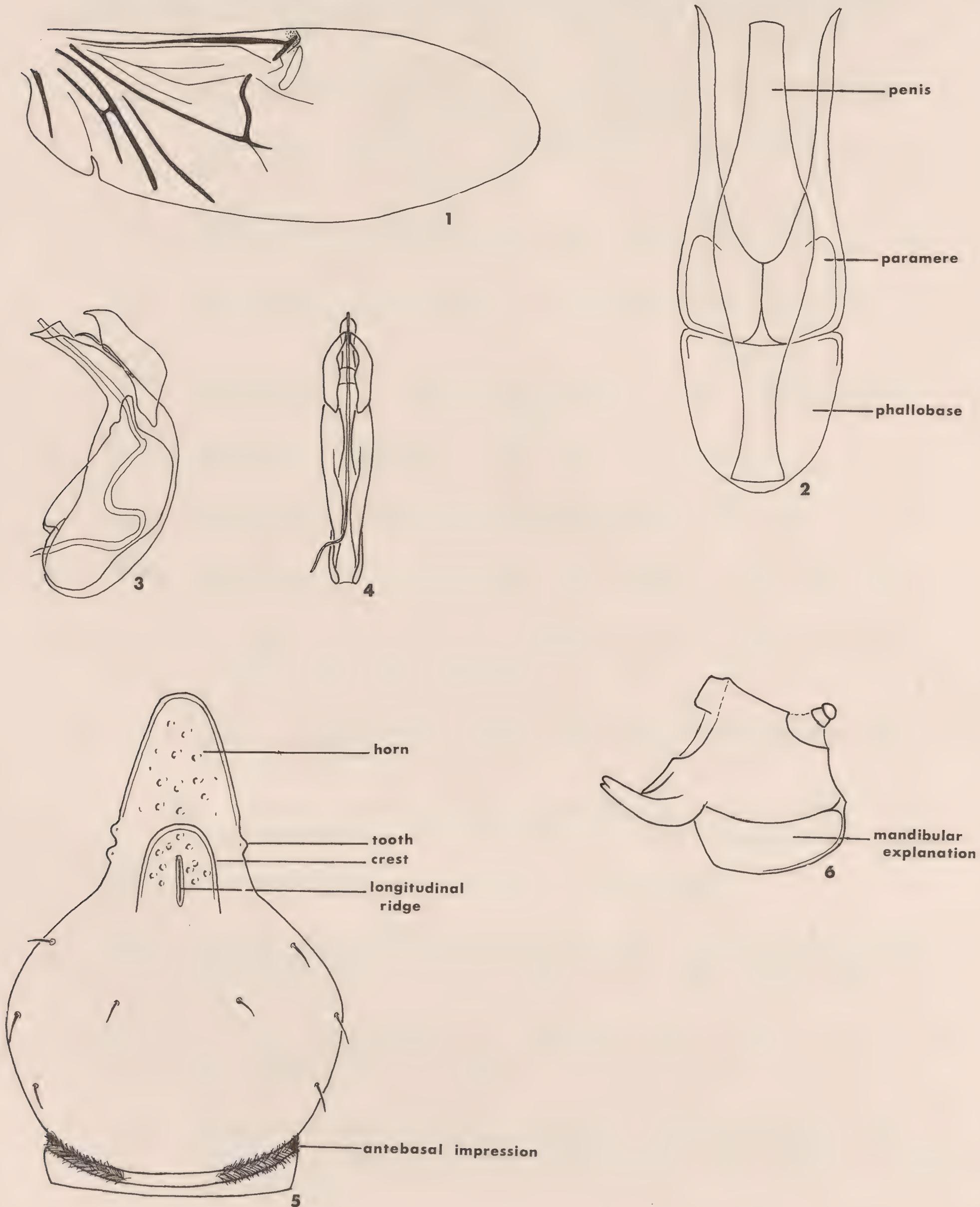
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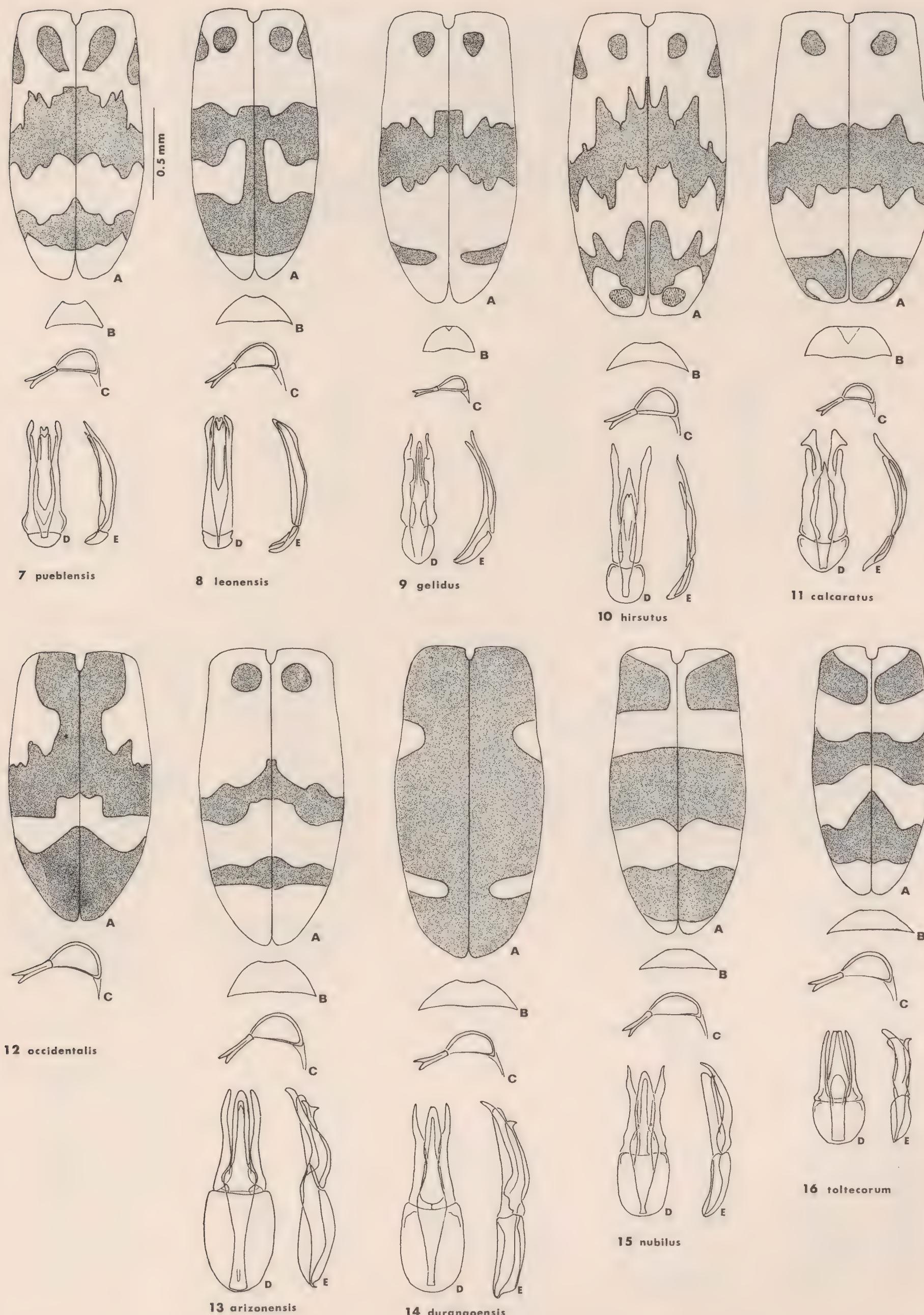
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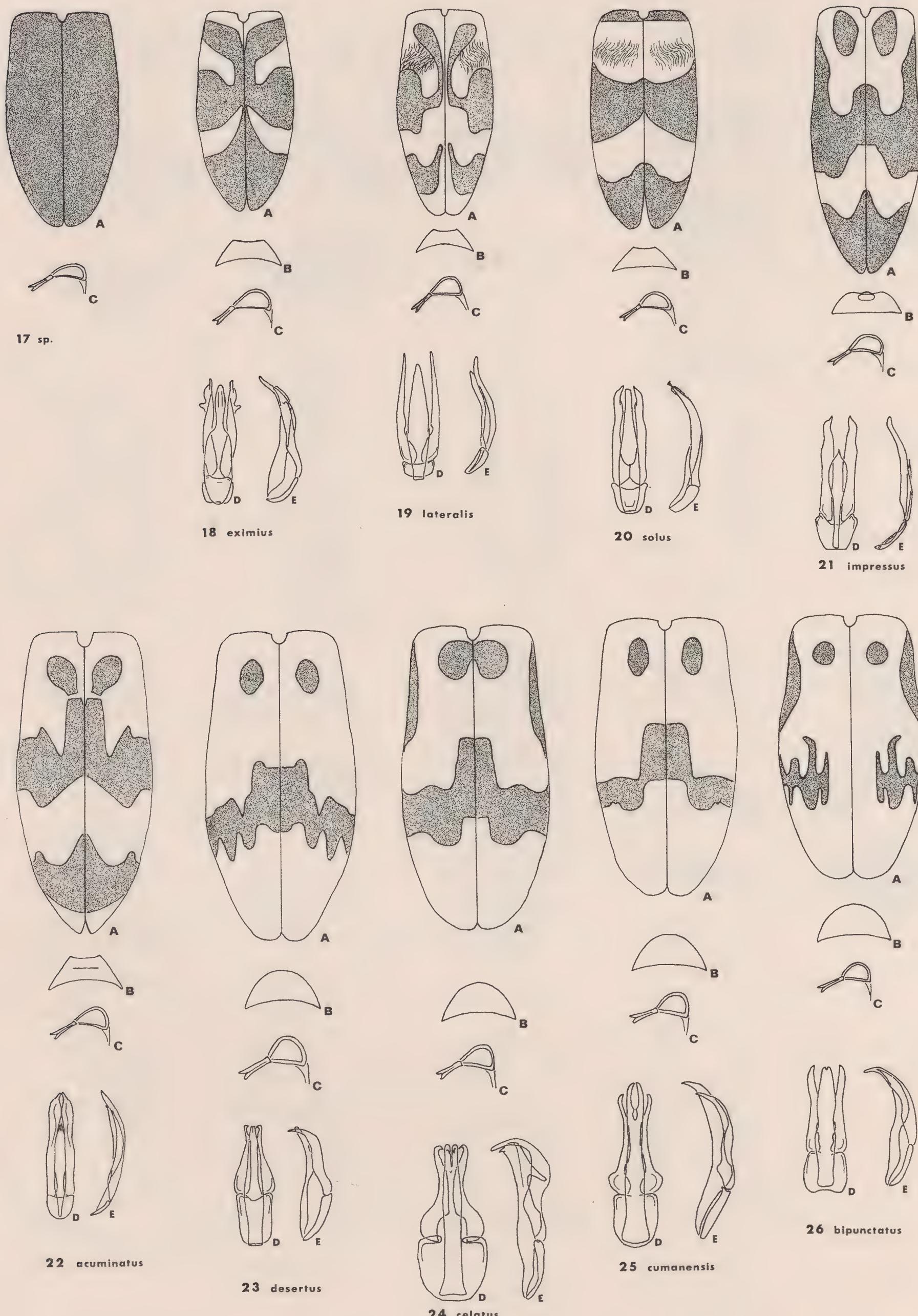
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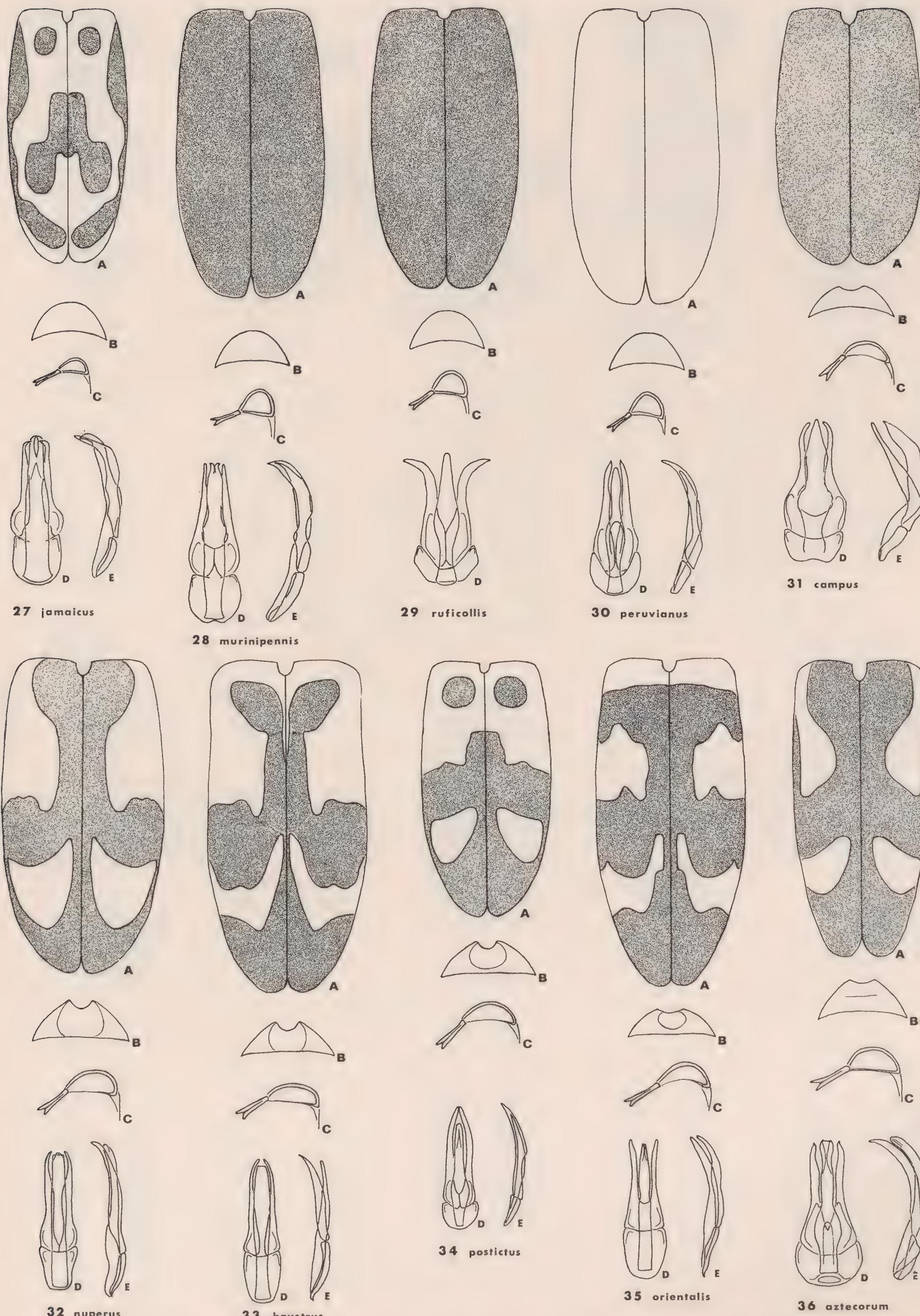
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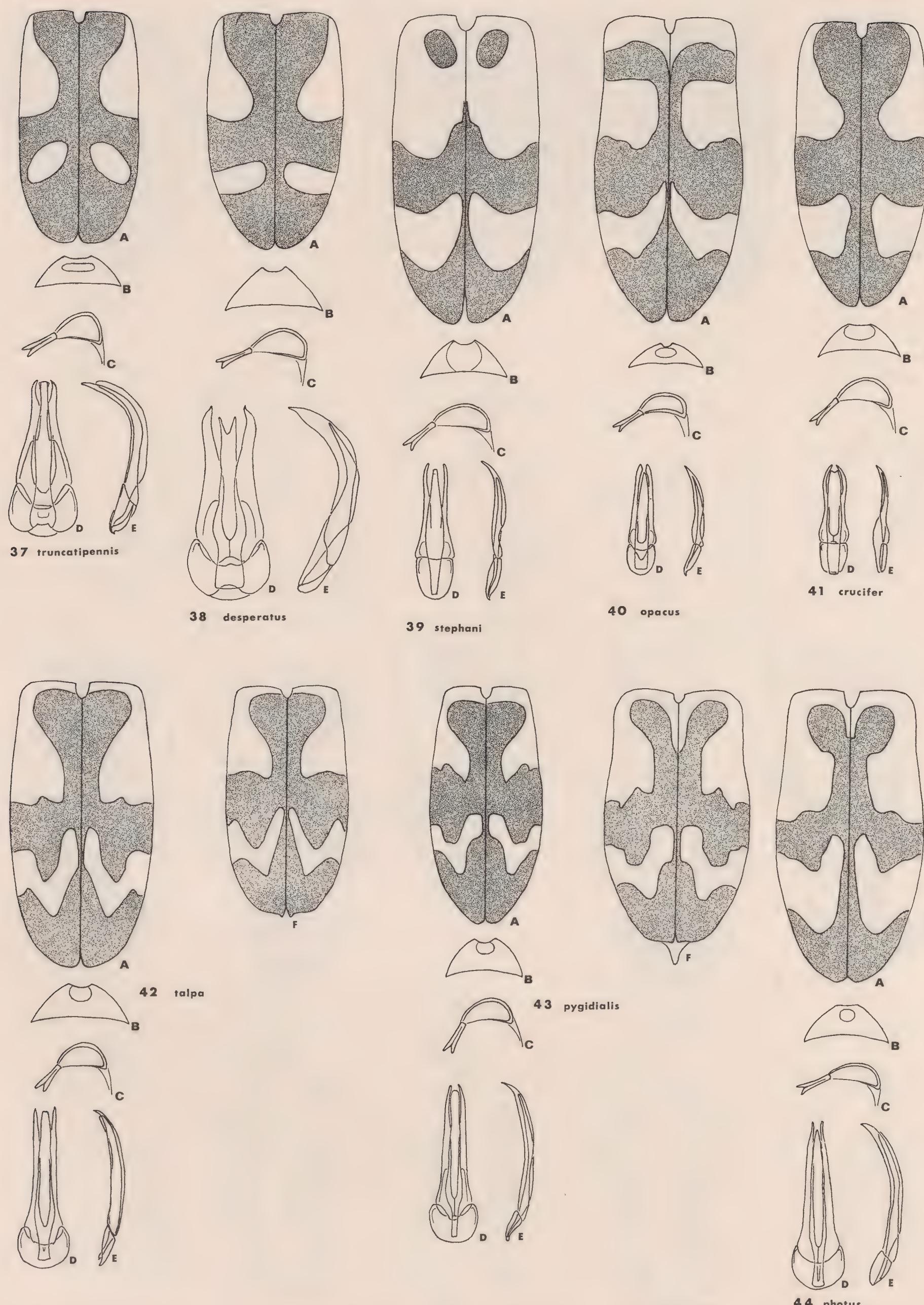
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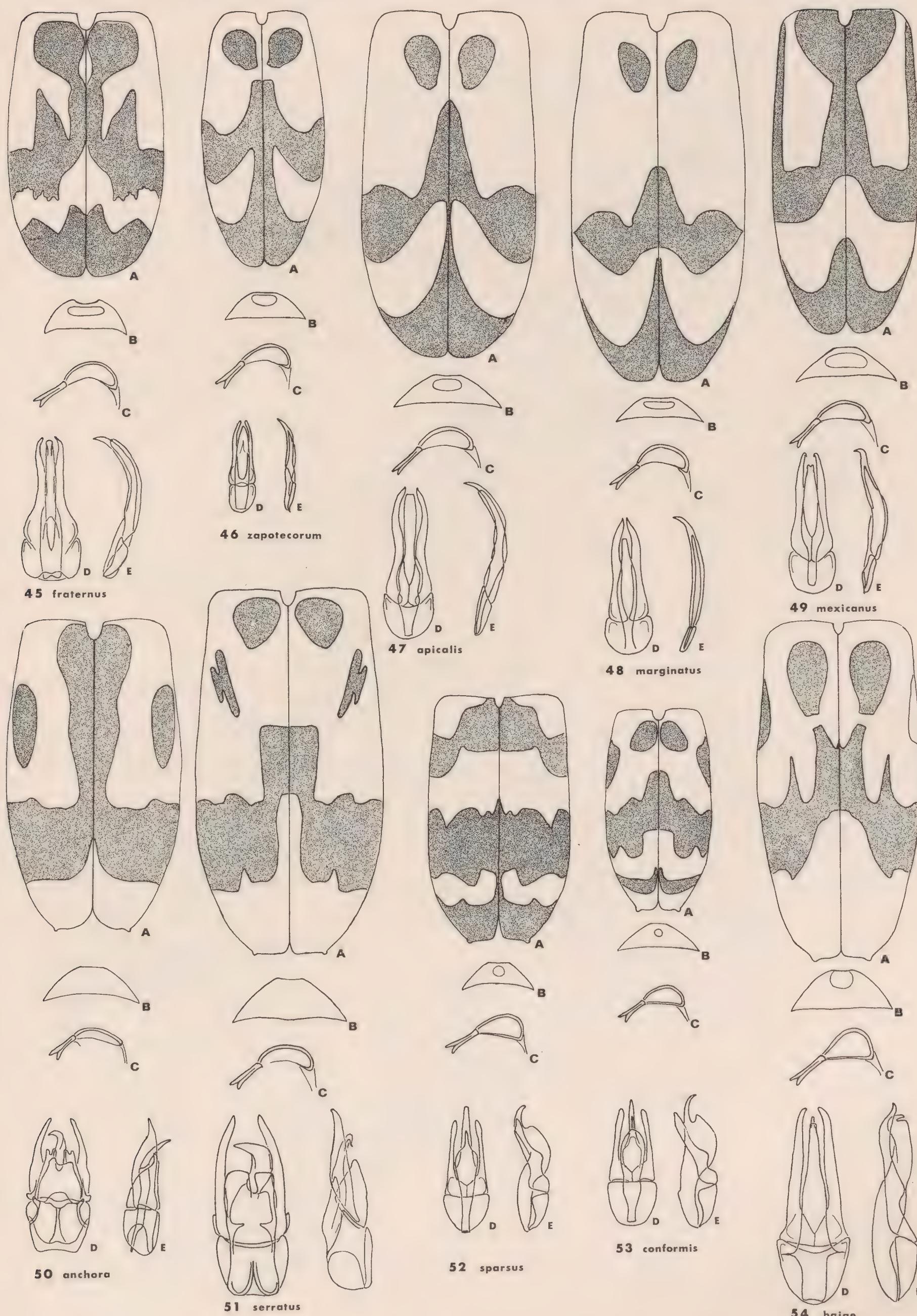
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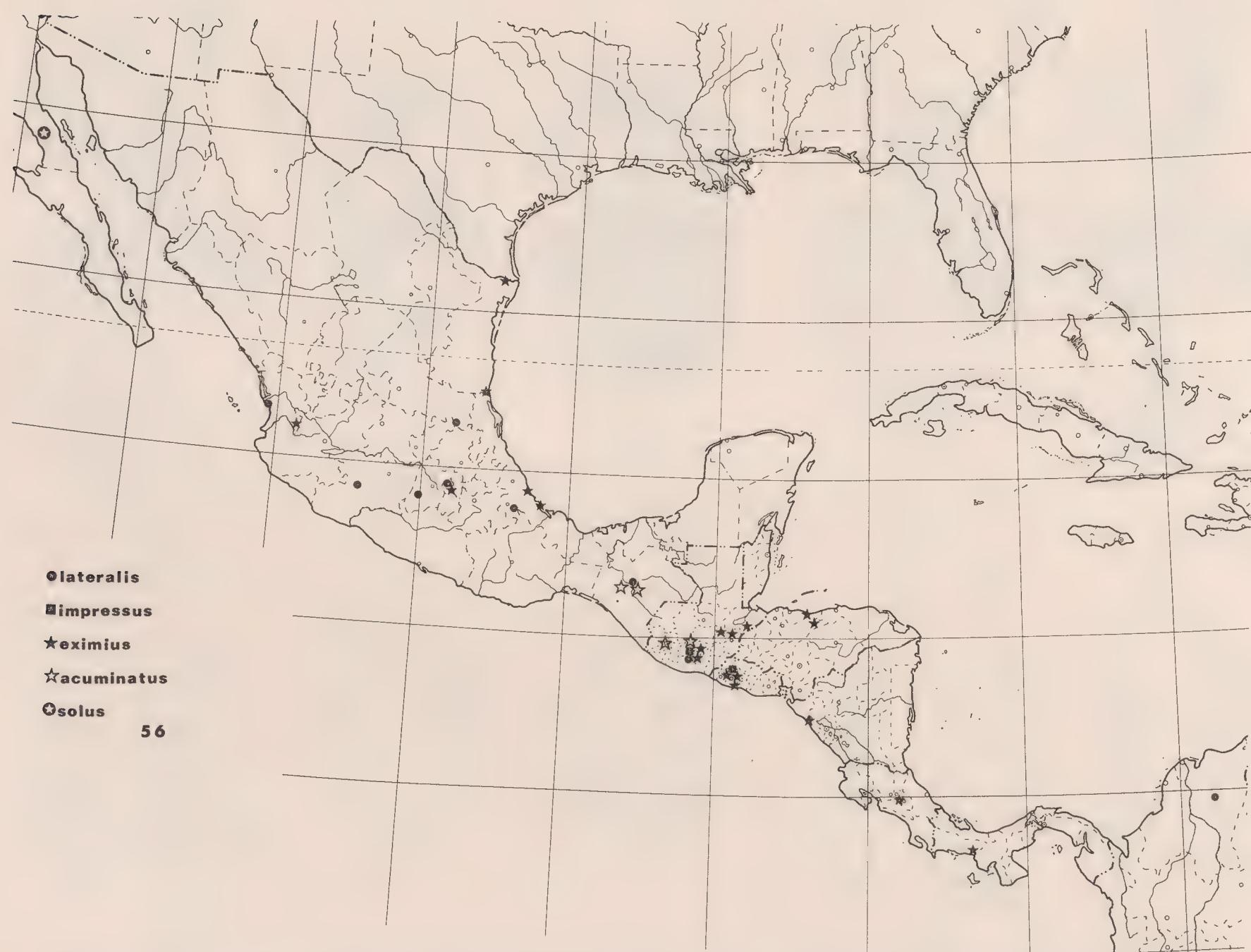
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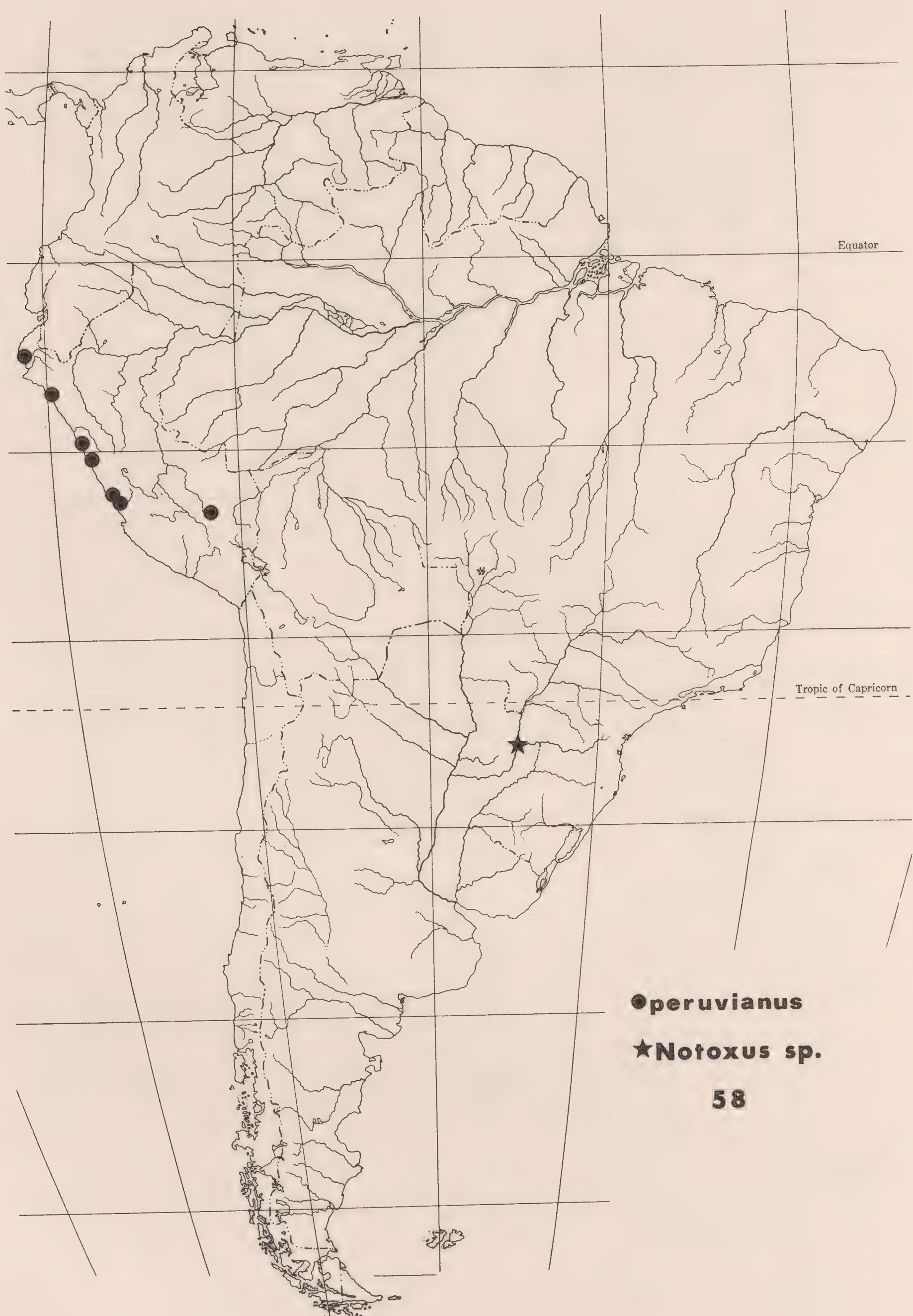
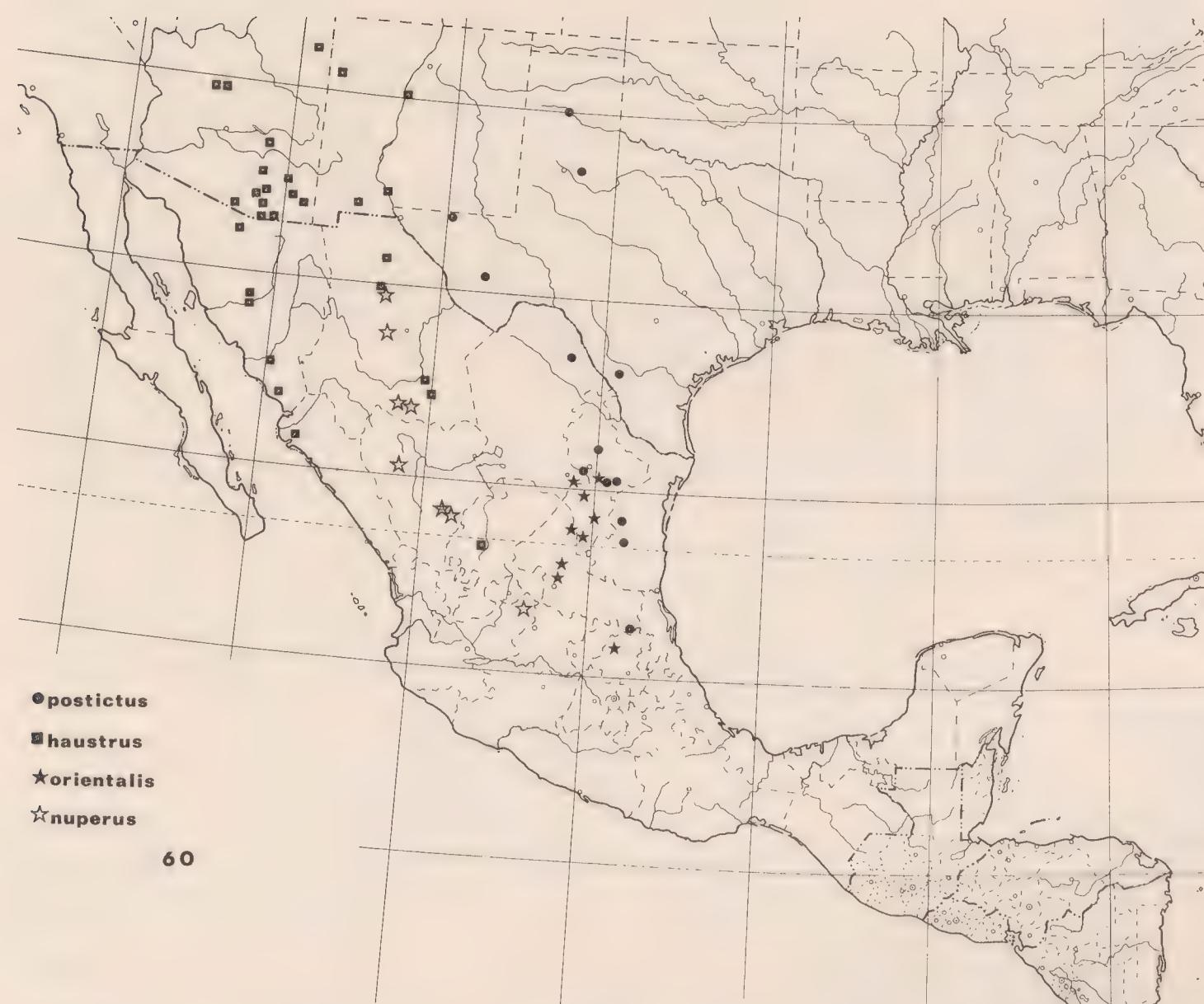
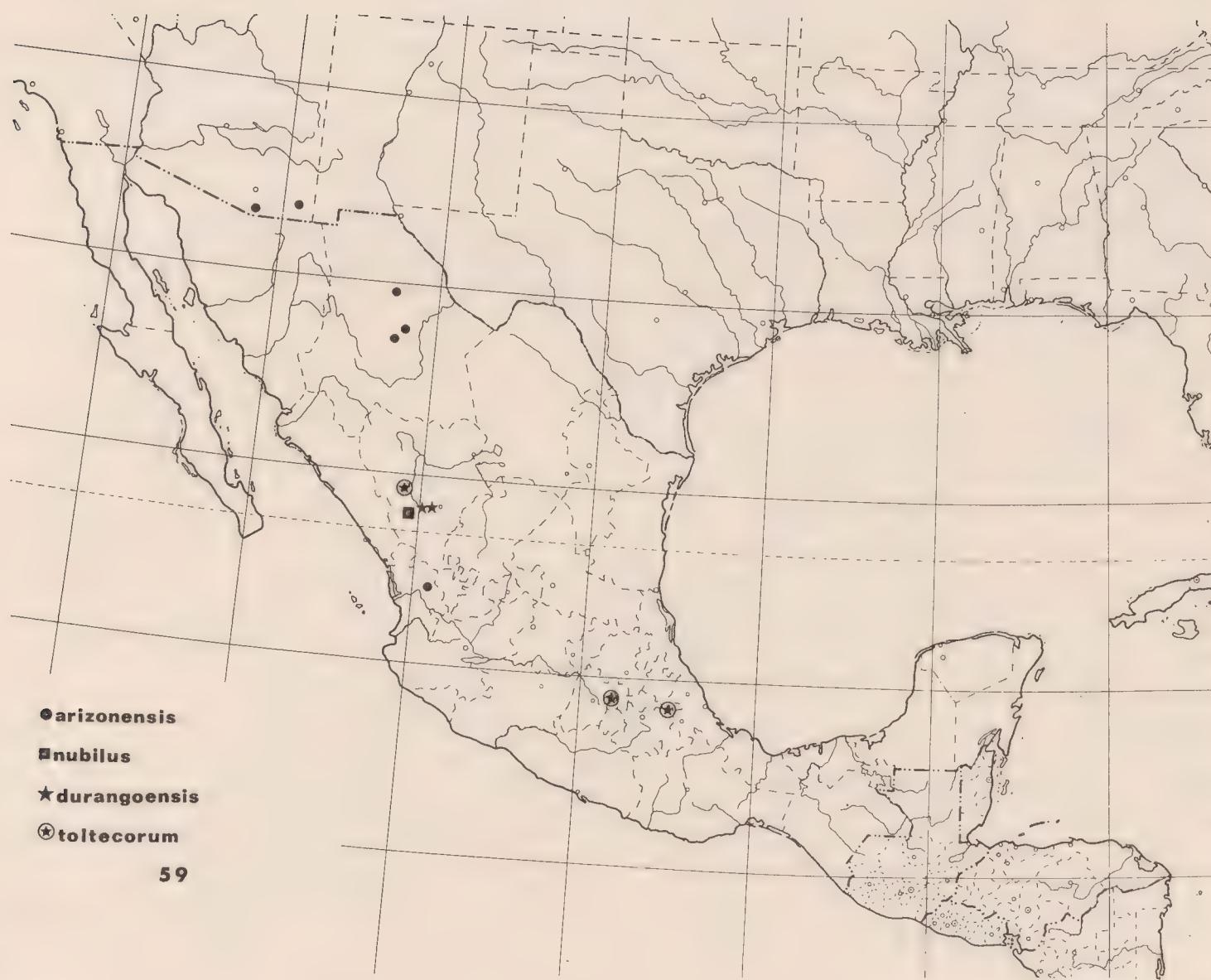
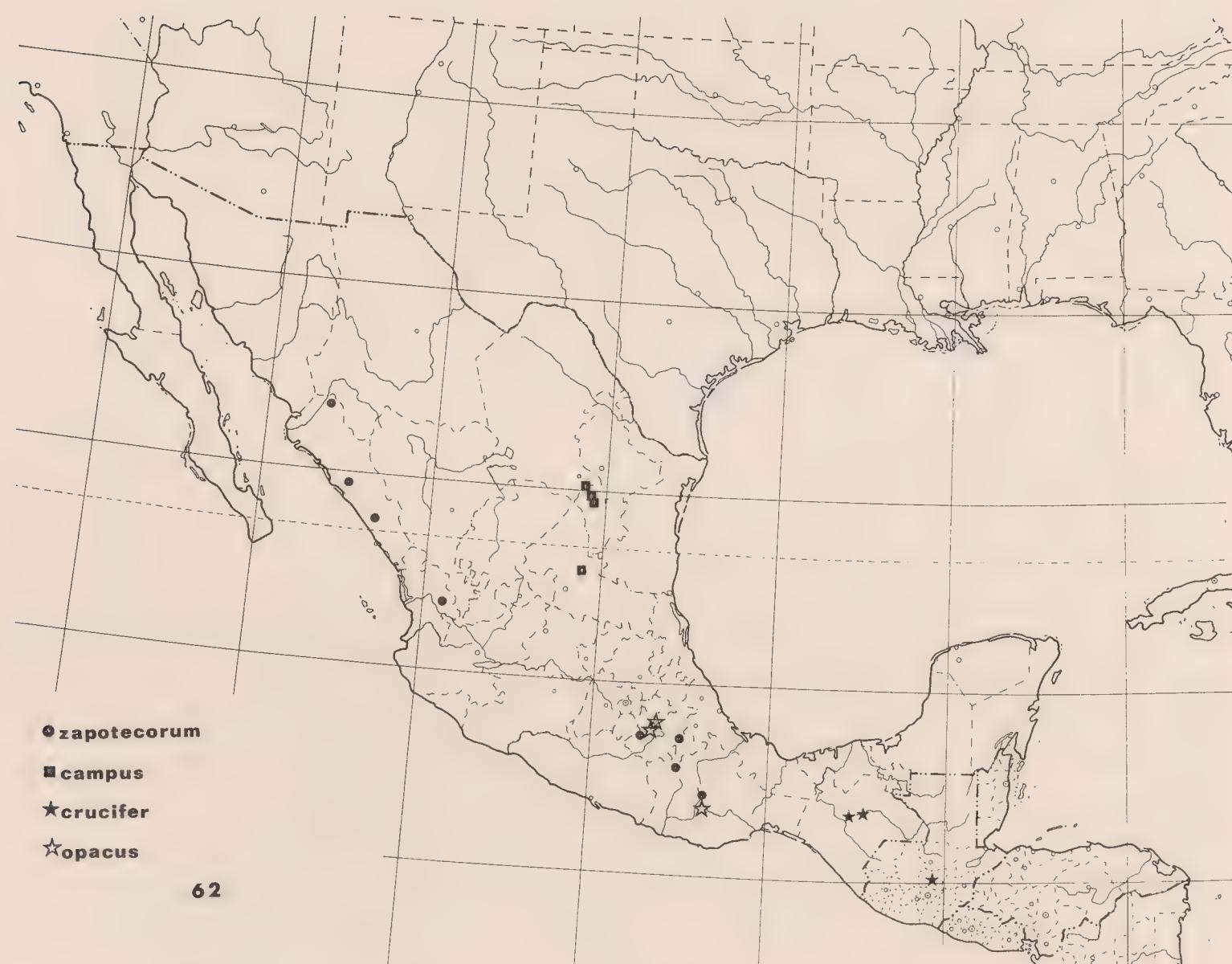


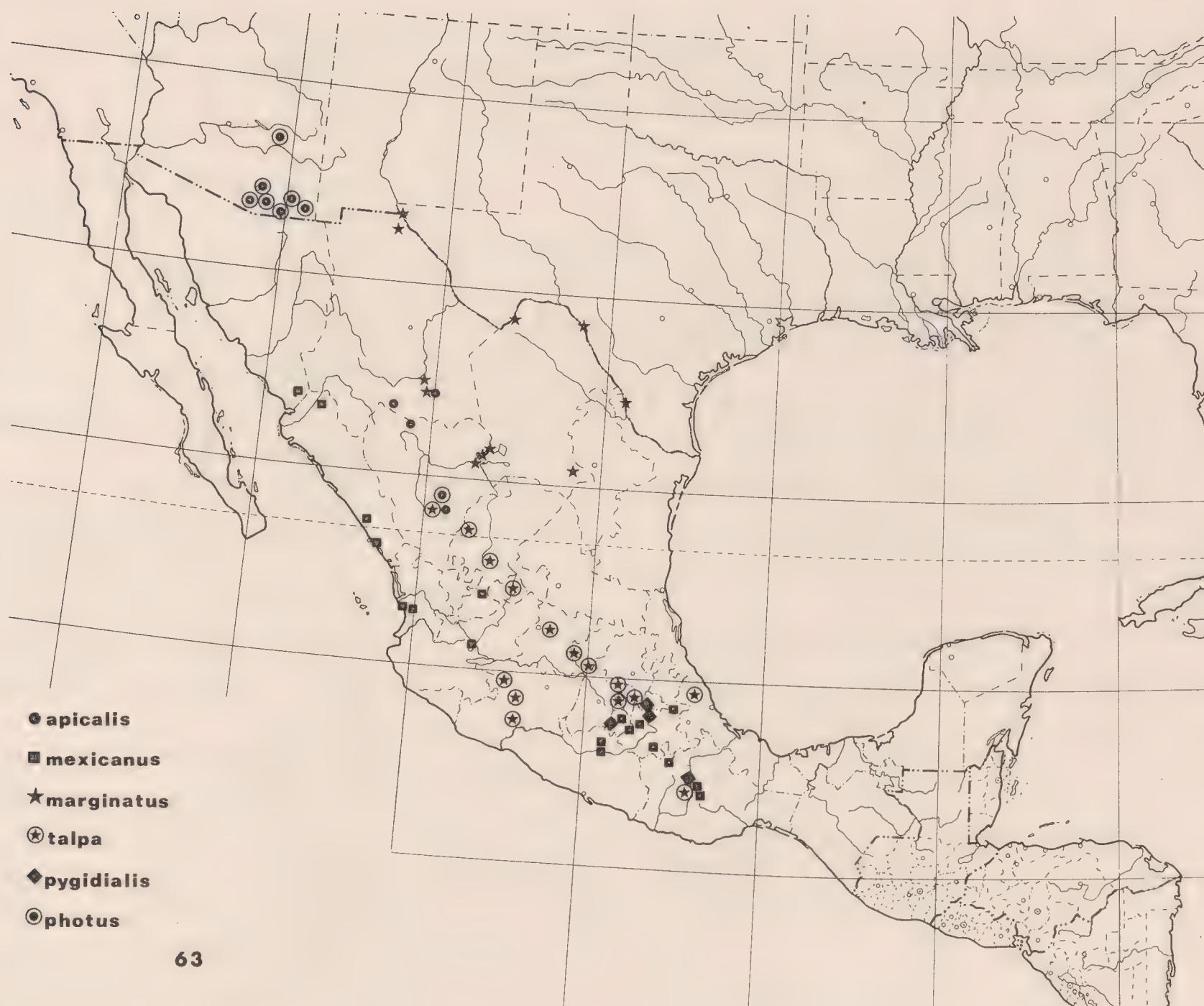
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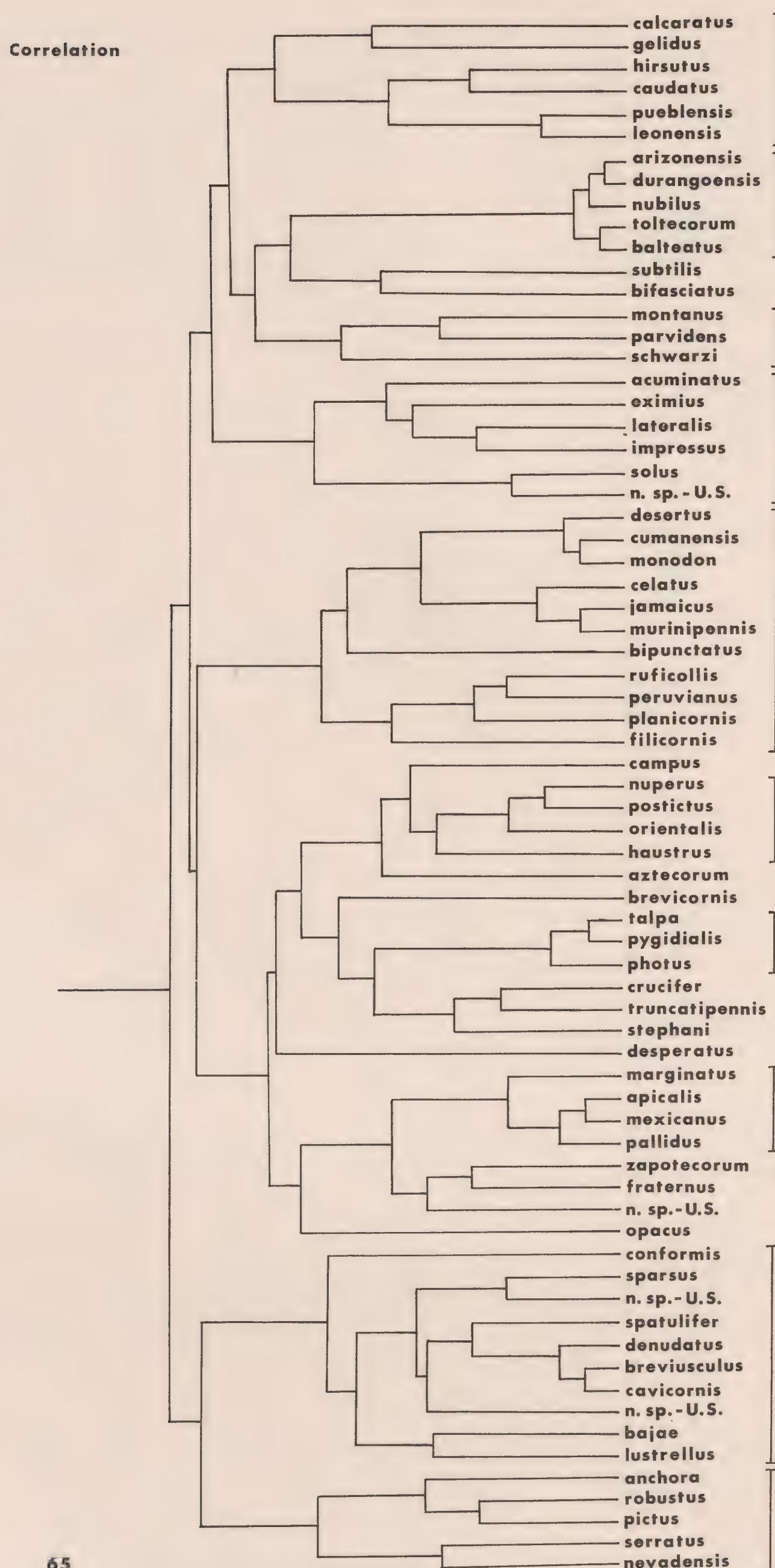


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